

**Incidence of and risk factors for canine osteosarcoma in**  
**Western Australia 2007-2009.**

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## **Abstract**

This thesis consists of 4 components:

Part One is a comprehensive log of the first 500 cases seen as an oncology resident at Perth Veterinary Oncology and an assessment of the proportion of different tumour cases presented during this time. Lymphoma was the most common disease seen, comprising 122/500 (24.4%) of cases. There were 88.4% canine cases and 11.6% feline cases. The majority of dogs were crossbreeds; however, the three most common pure breeds seen were the Labrador, golden retriever and Staffordshire bull terrier.

Part Two provides a description of the cases classified as 'Tumours of the Skeletal System'. Dogs with a confirmed diagnosis of osteosarcoma are then described. The patient signalment and disease presentation are compared and contrasted to previous studies to determine whether osteosarcoma in our cohort of dogs is a similar entity.

Part Three is a description of reported risk factors for the development of osteosarcoma. It includes a literature review demonstrating the evidence supporting or refuting these risks.

Part Four is a retrospective analysis of 33 canine patients diagnosed with appendicular osteosarcoma treated with amputation and an adjuvant chemotherapy protocol consisting of two doses of doxorubicin given two weeks apart, followed by four doses of carboplatin given at three weekly intervals. This chemotherapy protocol has not been previously described. The most effective adjuvant chemotherapy protocol for the treatment of canine appendicular osteosarcoma post limb amputation has not yet been determined, and this study of a novel protocol may help to further define this.

## **Declaration**

I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary education institution.

Dr Amy E Lane

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## **PART ONE**

DATE	CATEGORY	PATIENT DETAILS	PRESENTATION	DIAGNOSTIC TESTS	DIAGNOSIS	TREATMENT and OUTCOME
10/09/07	Lymphosarcoma	Jack Francis 6yo Mn Poodle cross	Generalized lymphadenopathy with histopathologic diagnosis of lymphoma; bilateral uveitis and hyphaema	CBC, Biochemistry, U/A; IHC, bone marrow aspirate	B-cell, centroblastic lymphoma Stage IVb	UW-19. Recurrence 17/04/08; last recorded alive at 15/5/08 then lost to follow up
11/09/07	Lymphosarcoma	Devon Fildes 9yo Mn Welsh Springer spaniel	Generalized lymphadenopathy; fine needle aspirate diagnosis of lymphoma	Node biopsy for histopathology and IHC, bone marrow aspirate	T cell pleomorphic lymphoma Stage IIIa	HDC-BMT. Recurrence 03/2008; rescue protocol using Lomustine 70mg/m2 every 3 weeks; died 30/07/08 after 4 doses Lomustine
13/09/07	Lymphosarcoma	Mia Massey 3yo F Dogue de Bordeaux	Mild, Generalized lymphadenopathy; resolving hypercalcaemia; FNA suggestive of lymphoma	Node biopsy for histopathology and IHC	T cell pleomorphic lymphoma; Stage IIIb	UW-19. Initial response to treatment but recurrence during induction protocol; euthanased 02/11/07
14/09/07	Tumours of the skin and subcutaneous tissues	Bear Palermo 4yo Mn Rottweiler	Swollen, ulcerated mass on toe 5 right hind foot; dog started licking it 5 weeks prior; incisional biopsy diagnosed melanoma	CBC, Biochemistry, U/A; FNA popliteal node; abdominal ultrasound; thoracic radiographs	Subungual malignant melanoma; T3N0M0	Surgery (toe amputation); carboplatin every 3 weeks x 6. Suspected boney metastasis of toe 3 left fore foot 13/5/08; euthanased
17/09/07	Leukaemias and myeloproliferative disorders	Alex Cunningham 8yo Mn Golden Retriever	Lethargy and inappetance for 2-3 weeks; CBC suggestive of leukaemia	CBC, bone marrow aspirate	ALL; Stage Vb	Palliation with prednisolone and enrofloxacin. Euthanased 20/9/07
19/09/07	Tumours of the skeletal system	Tango Matthews 11yo Fn Whippet	Firm swelling on 8 <sup>th</sup> rib right side noted one month prior; radiographs showed lytic lesion	Jamshidi biopsy of bone lesion	Osteosarcoma; T2Mx	Palliation (meloxicam and tramadol). Lost to follow up
19/09/07	Haemangiosarcoma	Major Bailey 8yo Mn Rottweiler	One month history of rapidly growing mass over left thoracic inlet; histopathologic diagnosis of haemangiosarcoma	CBC, Biochemistry, U/A; thoracic radiographs; abdominal ultrasound	Invasive cutaneous haemangiosarcoma; T2N0M0	Doxorubicin and cyclophosphamide every 3 weeks x 6. No recurrence as of December 2008
21/09/07	Lymphosarcoma	Isah Nguyen 6yo Fn Kelpie cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	CBC, Biochemistry; thoracic radiographs; abdominal ultrasound; node biopsy for histopathology and IHC; bone marrow aspirate	Lymphoma (IHC inconclusive); Stage IVa	UW-19. Recurrence 18/3/08; Killed by Motor Vehicle Accident April 2008
25/09/07	Mast Cell Tumours	Jack Lavell 7yo Mn Staffordshire bull terrier	Small mass noted 8 weeks prior; excisional biopsy diagnosed mast cell tumour, grade 2, clean but close margins	CBC, Biochemistry, U/A; abdominal ultrasound; FNA nodex2; bone marrow aspirate	MCT grade 2; T1N0M0; Stage 0a	Vinblastine x 8. No recurrence as of 1/11/08
26/09/07	Haemangiosarcomas	Beefcake Gibbons 8yo Mn Rottweiler cross	Presented to referring vet collapsed with haemabdomen; presented to PVO 3 weeks post splenectomy	Chest radiographs, abdominal ultrasound, CBC	Splenic haemangiosarcoma; T2N0M0, Stage II	VAC protocol. Intra-abdominal recurrence 26/11/07; euthanased
26/09/07	Cancer of the Nasal Planum	Kiwi Eyles 15yo Fn DSH cat	12 month history of early crusts on nasal planum; seen 2 weeks post nasal biopsy	None	Squamous Cell Carcinoma; T1N0M0	Cryosurgery. Disease recurrence; referred for 'nosectomy'; complete excision and no further recurrence
28/09/07	Lymphosarcoma	Zoe Lisle 4yo Fn German Shorthaired Pointer	Chronic diarrhea and weight loss; exploratory laparotomy and biopsy diagnosed lymphoma	Bone marrow aspirate; Vitamin B12 and Folic acid measurement	Gastrointestinal (duodenal) LSA; Stage Ib	UW-19. Owner stopped treatment mid protocol due to side effects; lost to follow up
02/10/07	Tumours of the Skeletal System	Clancy Gow 7yo Mn Rottweiler cross	4/5 lame right foreleg for 2 months	None	Open; T2Mx	None. Euthanased 02/10/07
03/10/07	Lymphosarcoma	Loki Nesic 5yo Mn Pit bull terrier cross	Multiple dermal nodules; excisional biopsy diagnosed lymphoma	IHC on previous biopsy (CD3, CD79a)	Cutaneous T cell lymphosarcoma; Stage Ia	None. Owner declined further diagnostics and treatment; euthanased 17/12/07
05/10/07	Lymphosarcoma	Frasier Smith 4yo Mn Rottweiler cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	None. Owner declined further diagnostics and treatment; euthanased due to disease progression 12/11/07
08/10/07	Lymphosarcoma	Manson Foley 11yo Mn German shepherd cross	Generalized lymphadenopathy; pyrexia; inappetance; FNA node diagnosed lymphoma	CBC, Biochemistry	Lymphosarcoma; Stage IIIb or higher	Doxorubicin every 3 weeks x 6. Recurrence 24/2/08 and euthanased

09/10/07 17	Cancer of the Nasal Planum	Milo Orchard 11yo Fn DSH	Nasal, pinna and possible facial SCC lesions for 12 months	CBC, Biochemistry, U/A; FNA submandibular lymph nodes	Squamous cell carcinoma; T1N0M0	Cryotherapy. Aggressive recurrence; repeat cryotherapy plus intralesional electrochemotherapy trialed; further recurrence
10/10/07 18	Lymphosarcoma	Foggy House 10yo Fn Blue Heeler	Mild lymphadenopathy; receiving prednisolone	None	Lymphosarcoma; Stage IIIa or higher	Doxorubicin every 3 weeks x 6. Euthanased after 3 treatments due to gastrointestinal toxicities post treatments
11/10/07 19	Mast Cell Tumours	Cabernet Boulton 5yo Fn Staffordshire Terrier cross	Mass slowly growing over the last 3 months. Seen 2 weeks post surgery; clean but close margins	None	MCT grade 2; T1NxMx; Stage 0a or higher	None. Owner declined further diagnostics and treatment. Seen by referring vet 24/9/08 for a lump on the neck
11/10/07 20	Tumours of the skeletal system	Hero Lee 7yo M Akita	4/5 lame left foreleg for one month; radiographs showed large lytic-proliferative lesion of proximal humerus	None	Open; T2Mx	Palliation with codeine and carprofen. Euthanased 17/10/07 due to inability to control pain
12/10/07 21	Hepatic Tumours	Max McCarthy 8yo Mn Bichon Friese	Presented to referring vet unwell; abdominal ultrasound found solitary hepatic mass; examined 2 weeks post liver mass resection	CT scan chest and abdomen; CBC, Biochemistry	Hepatocellular carcinoma; T1N0M0	Monitoring only; repeat CT scan and bloods in 3-6 months. Still alive as of 23/6/08
12/10/07 22	Soft Tissue Sarcomas	Ben Adams 9yo Mn Kelpie cross	Completely resected mass from inner right lip which had been present for 2 months	CT scan jaw and chest; CBC, Biochemistry	Undifferentiated sarcoma, Grade 3; T1aN0M0, Stage II	Nothing further. Seen by referring vet March 2008 for vaccination
17/10/07 23	Soft Tissue Sarcomas	Alpal Hodgson 14yo Mn Border Collie	Rapid growth of mass on proximal right antebrachium; FNA inconclusive	Needle core biopsy; FNA right prescapular node; thoracic radiographs; CBC, Biochemistry, U/A	Fibrosarcoma, Grade 2; T1aN0M0, Stage I	Referred for surgical resection. Clean but narrow margins achieved; post-operative wound breakdown; repeat surgery
17/10/07 24	Histiocytic Sarcomas	Holly Grant 5yo Fn Bernese Mountain dog	4/5 lame right hind leg; otherwise well; lytic lesion seen in distal right femur	IHC on previous biopsy sample; thoracic radiographs; abdominal ultrasound; CBC, Biochemistry	Histiocytic sarcoma – disseminated	Lomustine every 3 weeks x 8; pamidronate every 3-8 weeks; codeine, carprofen. Achieved prolonged partial remission; euthanased 07/05/08
23/10/07 25	Soft Tissue Sarcomas	Zac Mihalj 7yo Mn Chow Chow	10 days post biopsy; otherwise well	CBC, Biochemistry, U/A; CT thorax, abdomen, pelvis	Fibrosarcoma, Grade 2-3; T2bN0M0, Stage III	Referred for surgical resection – owners decided not to proceed. Disease progression; euthanased 13/12/07
24/10/07 26	Lymphosarcoma	Thor Date 4yo Mn Bull Terrier cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	None. Owner declined further diagnostics and treatment; euthanased 11/12/07
24/10/07 27	Lymphosarcoma	Sebastian Goddard 7yo Mn Labrador	Generalized lymphadenopathy; unwell and anorexic	Node biopsy for histopathology and IHC; bone marrow aspirate; CBC, Biochemistry, U/A	Diffuse, mixed, low grade T cell lymphoma; Stage IVb or higher	UW-19: not completed. Lost to follow up
25/10/07 28	Lymphosarcoma	George Mascal 14yo Mn Golden retriever	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	None. Owner declined further diagnostics and treatment; euthanased 16/05/08
25/10/07 29	Histiocytic Sarcomas	Zena O'Shea 10yo Fn Rottweiler	Post splenectomy	IHC on spleen; thoracic radiographs; abdominal ultrasound; CBC, Biochemistry, U/A	Histiocytic sarcoma – localized	Lomustine 3 weekly x 6. Disease recurrence; euthanased 10/12/07
26/10/07 30	Tumours of the skeletal system	Rolly Oliver 7yo M Rottweiler	One week acute onset lameness; seen post hind limb amputation	Thoracic radiographs; abdominal ultrasound; CBC, Biochemistry, U/A	Osteoblastic osteosarcoma; T2M0	Doxorubicin x2, carboplatin x4. Euthanased 30/1/08 after developing seizures
26/10/07 31	Tumours of the skin and subcutaneous tissues	Maddie Sier 17yo Fn Tonkinese	Mass over left eye present 2 months; excisional biopsy diagnosed melanoma, close margins	None	Cutaneous malignant melanoma; T1NxMx	None. Owner declined further diagnostics and treatment; still alive as of 18/8/08
29/10/07 32	Tumours of the skeletal system	Shingalana Turnbull 7yo Fn Bull Mastiff	3/5 lame left foreleg with pain on palpation of proximal humerus	Shoulder radiographs; thoracic radiographs; FNA left prescapular node; CBC, Biochemistry, U/A	Poorly differentiated sarcoma; T2M0	Limb amputation; doxorubicin x 2, carboplatin x 4. Owner ceased treatment after 3 doses for financial reasons ; still alive as of 24/9/08

29/10/07 33	Lung cancer	Shandy De Meo 10yo Fn German Shepherd	3 days of anorexia and suspected abdominal pain; radiographs showed solitary pulmonary mass; referring vet ultrasound guided FNA of mass suggestive of carcinoma	CT Thorax	Likely carcinoma based on FNA results, unable to give cell of origin; T1N0M0	Surgery declined; carboplatin every 3 weeks x 6. Side effects after first dose so owner declined further treatment Still alive as of 27/6/08
30/10/07 34	Tumours of the skeletal system	Eddie Mulcahy 5yo Mn English mastiff	2/5 lame left foreleg; firm swelling proximal to left carpus	Carpal radiographs; thoracic radiographs; Jamshidi bone biopsy; FNA left prescapular node	Poorly differentiated sarcoma; T2M0	Doxorubicin x 2, carboplatin x 4, Carprofen, codeine. Euthanased 30/01/08 due to inability to control pain
30/10/07 35	Lymphosarcoma	Keisha Hearne 8yo Fn Border collie cross	Generalized lymphadenopathy for 3 weeks; otherwise well	Node biopsy for histopathology and IHC; bone marrow aspirate; CBC, Biochemistry, U/A	Centroblastic B cell lymphoma Stage III-IVa	UW-19. Still in clinical remission as of July 2008
31/10/07 36	(Lymphosarcoma)	Toby Eyres 7yo Mn Rhodesian ridgeback cross	Weight loss despite good appetite	Thoracic radiographs; abdominal ultrasound; FNA spleen; CBC, Biochemistry, U/A	No abnormalities detected.	None. Dietary change allowed weight gain; no neoplastic disease diagnosed
31/10/07 37	Lymphosarcoma	Chelsea Hills 8yo Fn Rottweiler cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	None. Owner declined further diagnostics and treatment
01/11/07 38	Lymphosarcoma	Odin Cover 13yo Mn Border Collie	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma Stage IIIa or higher	None. Owner declined further diagnostics and treatment; euthanased 21/12/07
01/11/07 39	Haemangiosarcoma	Trudi Churn 9yo Fn Dachshund	Cavitatory mass on spleen, recovered from small haemorrhage; grade V/VI LHS systolic murmur	Echocardiography; thoracic radiographs	Splenic haematoma	Referral to surgery for splenectomy. Good recovery; seen October 2008 for vaccination and doing well
02/11/07 40	Lymphosarcoma	Milo Hopkins 8yo Mn Shih Tsu	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma Stage IIIa or higher	None. Owner declined further diagnostics and treatment
02/11/07 41	Lymphosarcoma	LittleJack Francis 8yo Mn JRT	Generalized lymphadenopathy; FNA suggestive of lymphoma; also anorexic for 2 weeks, marked weight loss and now icteric; neutropenic and large lymphocytes in circulation	None	Lymphosarcoma – Stage IVb or higher	HDC -BMT; intensive care on admission. Lymphoma recurred in CNS – confirmed with CSF tap; euthanased 10/03/08
05/11/07 42	Tumours of the skin and subcutaneous tissues	Woody Sullivan 7yo Mn Blue Heeler cross	Post skin biopsy; still multiple squamous cell carcinoma lesions at various stages of development	Abdominal ultrasound; CBC, Biochemistry, U/A	Squamous Cell Carcinoma; T1(2)N0M0	Cryosurgery. Marginal excision of 2 small masses; repeat cryosurgery on smaller crusts – 20/02/08; local recurrence so referred from aggressive surgical resection
06/11/07 43	Lymphosarcoma	Penny Charles 10yo Fn Fox terrier	Generalized lymphadenopathy – mild; already receiving prednisolone	CBC, Biochemistry, U/A; UPCR, urine M/C/S; abdominal ultrasound; renal biopsy	Lymphoma; Stage IIIa or higher; chronic renal failure	UW-19. Had an acute on chronic renal episode from which she could not be rescued. Euthanased December 2007
9/11/07 44	Soft Tissue Sarcomas	Genie Czerkasow 11yo Fn Jack Russell terrier	Incompletely resected mass from right foreleg	Thoracic radiographs; FNA right prescapular node	Poorly differentiated soft tissue sarcoma, Grade 2; T1aN0M0, Stage I	VAC protocol – mid protocol dropped to doxorubicin only every 3 weeks. No recurrence as of December 2008
12/11/07 45	Haemangiosarcoma	Tess Munday 8yo Fn Border Collie	Biopsied lesion of right third eyelid	Thoracic radiographs; abdominal ultrasound	Cutaneous Haemangiosarcoma; T0N0M0; Stage I	Referral for excision of third eyelid. Ophthalmologist couldn't locate any diseased tissue so only perform surgery if recurrence
13/11/07 46	Tumours of the Endocrine System	Layla Gibson 9yo Fn Beagle	In remission with lymphosarcoma; follicular thyroid carcinoma diagnosed on incisional biopsy	Thoracic radiographs; thyroid ultrasound	Multilocular cystic hyperplasia (adenoma); T2aN0M0, Stage II	Referral for surgical resection. Owner declined adjuvant chemotherapy. Dog alive and well with no recurrence of lymphoma or thyroid carcinoma January 2009
15/11/07 47	Tumours of the Skin and Subcutaneous Tissues	Apollo Cullura 5yo Mn Boxer	Completely resected mass from left lower lip	None	Malignant Melanoma; T0NxMx	None. Owner declined further diagnostics and treatment
15/11/07 48	Soft Tissue Sarcomas	Charlie Phillips 17yo Mn Cocker spaniel	Excisional biopsy of mass over right antebrachium; incomplete excision	Thoracic radiographs; FNA right prescapular nodes	Haemangiopericytoma, Grade 2; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. No recurrence of tumour at euthanasia 28/05/08



16/11/07 49	Soft Tissue Sarcomas	Owen Zeeman 6yo Mn Ridgeback cross	Incompletely resected grade 1 haemangiopericytoma from cranial right elbow	Thoracic radiographs; FNA right prescapular node	Haemangiopericytoma, Grade 1; T1aN0M0, Stage I	Referral for aggressive surgical resection. Complete excision achieved; no further treatment required; no recurrence as of May 2008
19/11/07 50	Tumours of the skin and subcutaneous tissues	Clancy Meggeson 7yo Mn Labrador	Massive subcutaneous growth on right lateral thigh over 2 years	Biopsy mass; CT leg; CBC, Biochemistry	Intermuscular Lipoma; T3NxMx	Referral for surgical resection. 3.3kg mass removed and dog recovered very well
20/11/07 51	Lymphosarcoma	Major Brain 11yo Mn Bull terrier cross	Generalized lymphadenopathy; FNA suggestive of lymphoma; inappetance for a week	CBC, Biochemistry	Lymphosarcoma Stage IIIb or higher	Doxorubicin q3wks x 6. Suffered side effects from chemotherapy and was euthanased 25/11/07
22/11/07 52	Soft Tissue Sarcomas	Rommel Gosbell 6yo Mn Miniature Pinscher	Mass on left side of lumbar musculature	CBC, Biochemistry, U/A; CT thorax and mass	Poorly differentiated sarcoma, possible liposarcoma, Grade 3; T2bN0M0, Stage II	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Progressive disease; medication stopped 7/3/08; euthanased due to disease progression June 2008
23/11/07 53	(Lymphosarcoma)	Sheba Craigie 13yo Tonkinese	Mediastinal mass	U/S guided FNA of mass, CT mass and chest	Keratinizing branchial cleft cyst	Referral for surgical excision. Died post-operatively due to hypotension
23/11/07 54	Mast Cell Tumours	Tammy Fairley 5yo Fn Golden Retriever	Close margin resection of low grade tumour	CBC, Biochemistry; abdominal ultrasound; bone marrow aspirate	MCT grade 1; T1N0M0; Stage 0a	Vinblastine and prednisolone protocol. Lost to follow up
26/11/07 55	Tumours of the skin and subcutaneous tissues	Ally Ludlow 10yo Fn Kelpie cross	Close excision low grade malignant fibrous histiocytoma from left hind foot	CBC, Biochemistry, U/A; FNA left popliteal node; abdominal ultrasound	Malignant fibrous histiocytoma; T0N0M0	None until/if recurrence. Represented 18/4/08 for masses on the neck and right hind foot which were biopsied and diagnosed as undifferentiated sarcomas. Thoracic radiographs demonstrated multiple large pulmonary nodules
27/11/07 56	Tumours of the Skeletal System	Nellie Junk 11yo Fn Rottweiler	Osteolytic mass attached to buccal side of left mandible	CBC, Biochemistry, U/A; CT jaw and thorax; biopsy mass	Osteolytic sarcoma; T2M1	Palliative: clindamycin, carprofen, codeine. Euthanased 20/12/07
28/11/07 57	Haemangiosarcoma	Kahlua Puntigam 10yo Fn German Shepherd	Post splenectomy; hepatic nodules sighted at surgery	None further	Splenic haemangiosarcoma; T2N0M1, Stage III	VAC protocol. Euthanased 25/1/08 due to seizures
03/12/07 58	Lymphosarcoma	Ben Watts 12yo Mn Pitt Bull terrier cross	Generalized lymphadenopathy; FNA suggestive of lymphoma; hepatosplenomegaly palpable	CBC, Biochemistry, U/A	Lymphosarcoma Stage IVa or higher	Doxorubicin every 3 weeks x 6. Became resistant to doxorubicin after 2 doses. Changed protocol to UW-19 but no response after one cycle; treatment discontinued; euthanased.
03/12/07 59	Lymphosarcoma	Zor Blazey 10yo Mn Bull Terrier cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	CBC, Biochemistry, U/A; bone marrow aspirate	Lymphosarcoma Stage IIIa	UW-19. Recurrence of disease July 2008; euthanased 05/08/08
04/12/07 60	Mast cell Tumours	Carrie Taylor 11yo Fn Golden retriever	Multiple dermal masses	Incisional biopsy all masses, FNA regional nodes; abdominal ultrasound; bone marrow aspirate.	Multiple MCTs; T1(4)N0M0; Stage IIIa	Neoadjuvant chemotherapy. No reduction in size with neoadjuvant chemotherapy. Referred to surgery for excision of masses; followed by adjuvant Vinblastine and prednisolone protocol
05/12/07 61	Tumours of the skin and subcutaneous tissues	Chewy Moore 14yo Mn Staffordshire bull terrier	Very large, ulcerated perineal mass	FNA mass; CBC, Biochemistry, U/A	Undifferentiated round cell tumour; T3NxMx	Palliative – prednisolone. Lost to follow up
07/12/07 62	Haemangiosarcoma	Bella Harding 8yo Fn Golden retriever	Post splenectomy; no evidence of hepatic nodules or enlarged nodes at exploratory laparotomy	None further	Splenic haemangiosarcoma; T2N0M0, Stage II	None. Owner declined further diagnostics and treatment

07/12/07  63	Nasal Tumours	Leo Jarvis 10yo Mn DLH cat	6 week history of progressive increased snuffling then mucoid nasal discharge from right nostril; seen post nasal flush biopsy	Chest radiographs, FNA right submandibular lymph node	Nasal adenocarcinoma; T1N0M0	Alternating Carboplatin, Doxorubicin; piroxicam. Developed snuffling, nasal discharge then neurological signs after 5 treatments. CT scan showed no gross intracranial lesions nor breach of cribriform plate; large soft tissue density still present in nasal cavity; euthanased December 2008
10/12/07  64	Lymphosarcoma	Herman Gilbert 11yo Mn domestic shorthaired cat	Generalized lymphadenopathy; FNA suggestive of lymphoma	Node biopsy; thoracic radiographs; abdominal U/S, echocardiogram; bone marrow aspirate; TT4	Diffuse, large cell, high grade lymphoma Stage III	Palliative – prednisolone. Euthanased 10/1/08 due to inappetance, lethargy and Generalized lymphadenopathy
10/12/07  65	Mast Cell Tumours	Jock Gillingham 8yo M Staffordshire bull terrier	Incompletely resected mass from scrotum	CBC, Biochemistry, U/A, abdominal ultrasound; FNA medial iliac nodes; bone marrow aspirate	MCT grade 3; T1N0M0; Stage 0a	Vinblastine, prednisolone. Recurrence 5 weeks after initial presentation – referred for radical excision; recommenced Vinblastine, Lomustine, prednisolone protocol but dog developed repeated neutropenic sepsis despite dose reductions; owner declined further treatment
12/12/07  66	Soft Tissue Sarcomas	Harry Grygorcewicz 14yo Mn Labrador cross	Incompletely resected soft tissue sarcoma from left foreleg	FNA left prescapular node; thoracic radiographs	Soft tissue sarcoma, Grade 2; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Lost to follow up
14/12/07  67	Lung Cancer	Charlotte Graham 8yo Fn bull mastiff cross	Very large intrathoracic mass; biopsy inconclusive	None	Open	Trialled one cycle of VAC protocol. Repeat CT scan showed disease progression and no further treatment given; lost to follow up
14/12/07  68	Cancer of the oral cavity	Sophia Olden 1yo Fn DSH cat	Lesion proximal to left upper canine tooth	CT scan head and thorax	Ameloblastic fibroma; T1bN0M0, Stage I	Referred for surgical resection. Complete excision, no further treatment required
17/12/07  69	Mast Cell Tumours	Angel Schelfhout 6yo Fn Boxer	Ulcerated mass removed from caudal left mammary chain; histopathologic diagnosis of mast cell tumour, grade 3; Recurrence of primary tumour within 3 weeks; nodal metastasis palpable at this time	FNA recurrent mass, FNA enlarged inguinal node; abdominal ultrasound; bone marrow aspirate; CBC, Biochemistry, U/A.	MCT grade 3; T1N1M0; Stage IVb	Referred for surgical excision of recurrent mass and inguinal node; adjuvant chemotherapy using Vinblastine, Lomustine, prednisolone protocol. Recurrence 2 weeks post surgery; continued adjuvant chemotherapy using Vinblastine, Lomustine, prednisolone protocol but developed progressive disease. Died 29/02/08
20/12/07  70	Cancer of the Nasal Planum	Missy Puss Chaplin 10yo Fn DLH cat	Advanced nasal planum squamous cell carcinoma; already treated with 2 surgeries and 4 cryotherapy treatments in the last year	FNA submandibular nodes; thoracic radiographs	Squamous Cell Carcinoma; T4N0M0	Carboplatin and Gemcitabine, every 3 weeks x 6. Euthanased three weeks after first dose due to lack of response
21/12/07  71	Lymphosarcoma	Chiffon Ross 9yo Fn Beagle	Generalized lymphadenopathy; FNA suggestive of lymphoma; palpable hepatosplenomegaly	Node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Diffuse, large cell, Lymphosarcoma B cell lymphoma; Stage Iva	UW-19. Didn't achieve complete remission; received 10/16 treatments of induction protocol then swapped to rescue protocol of Lomustine given every 3 weeks. Two doses administered before disease progression and euthanasia
21/12/07  72	Mast Cell Tumours	Abbi Scott 9yo Bernese mountain dog	Grade 2 mast cell tumour removed with 2mm from adjacent anus	None	MCT grade 2; T1NxMx; stage 0a or higher	None. Owner declined further diagnostics and treatment
24/12/07  73	Lymphosarcoma	Rosie Carling 12yo F Shih Tsu cross	Generalized lymphadenopathy; left caudal mammary mass	Node biopsy for histopathology and IHC; excisional biopsy mammary mass; abdominal ultrasound; bone marrow aspirate; CBC, Biochemistry, U/A	Diffuse, large cell lymphoma, T-cell; Stage IIIa; Benign mixed mammary tumour	UW-19. Disease recurrence noted at treatment 16/16.

28/12/07 74	Soft Tissue Sarcomas	Baillie McCartney 11yo Fn Golden retriever	8x8cm fixed mass on left thorax post incisional biopsy	None	Spindle cell sarcoma, Grade 2; T2bNxMx, Stage III or higher	None. Owner declined further diagnostics and treatment
28/12/07 75	Lymphosarcoma	Brandy Kittle 11yo Fn Heeler cross	Generalized lymphadenopathy; ecchymoses on ventrum	Node biopsy for histopathology and IHC; bone marrow aspirate; CBC, Biochemistry	Diffuse, large cell, immunoblastic, B cell lymphoma; Stage IVb	UW-19; prednisolone at 2mg/kg for 3 weeks, then weaned off once platelet count stable. Disease recurrence 3 months post chemotherapy; started rescue protocol of Lomustine every 3 weeks; 2 doses given before disease progression; euthanased 7/11/08
31/12/07 76	Tumours of the Skeletal System	Zharia Richter 7yo Fn Rottweiler	2/5 lame left hindleg; pain localized to distal femur	Jamshidi bone biopsy	Chondroblastic osteosarcoma; T2Mx	Palliation: carprofen and codeine. Owner elected euthanasia January 2008
02/01/08 77	Hepatic Tumours	Maggie Momber 10yo Fn Border Collie	Urinary incontinence; abdominal enlargement	CBC, Biochemistry, PT/PTT, ultrasound guided liver needle-core biopsy	Undifferentiated carcinoma; T2(m)NxMx	Palliation: piroxicam and ranitidine. Lost to follow up
04/02/08 78	Ocular Tumours	Winston Parasiliti 12yo Mn Poodle cross	1.5x2cm sessile mass near dorsolateral margin of left eye; lumbar pain	CT scan head, thorax and lumbar spine	Undifferentiated adenocarcinoma; T1N0M0	None. Owner declined further treatment
07/02/08 79	Mast Cell Tumours	Krassimir Santos 12yo Mn Labrador cross	Rapidly growing mass on right antebrachium; FNA suggestive of MCT	Biopsy of mass for histopathology; FNA right prescapular node; abdominal ultrasound; bone marrow aspirate	MCT grade 2 (high grade); T2N0M0; Stage 1a	Palliative: prednisolone, omega 3 fish oil; antihistamines as needed. Euthanased 26/6/08; the primary tumour had developed a draining fistula; the right prescapular lymph node was also markedly enlarged
07/02/08 80	Plasma Cell Neoplasms	Sasha Francis 13yo Fn Cairn terrier	Urinary incontinence; hyperglobulinaemia	Bone marrow aspirate; survey skeletal radiographs; serum plasmaphoresis	Multiple Myeloma	Melphalan 0.1mg/ kg sid for 10d, then eod for life; prednisolone 0.5 mg/kg sid for 10d, eod for 60d. Still alive and well January 2009 on 2mg Melphalan daily
08/02/08 81	Mast Cell Tumours	Angus Stuart-Smith 6yo Mn Pug	Incompletely resected grade 2 MCT left shoulder; second new mass under tail base noted at initial consult	FNA left prescapular node; abdominal ultrasound; biopsy mass under tail	Multiple MCT, Grade 2 and 1; T1(2)N0M0; Stage 3a	None. Last seen 31/10/08 by referring vet for unrelated problem
08/02/08 82	Tumours of the Intestinal Tract	Max Moir 3yo Mn Blue Heeler	Diarrhoea and weight loss; hypercalcaemia; thickened descending colon and enlarged mesenteric nodes	CBC, Biochemistry, U/A; Parathyroid hormone assay; upper and lower gastrointestinal endoscopy	Large cell lymphoma of T cell origin with low to intermediate grade	None. Owner elected euthanasia
11/02/08 83	Tumours of the Endocrine System	Seth Richerdson 11yo Mn Alaskan malamute	7x6cm firm, fixed mass ventral right neck	Needle core biopsy	Thyroid carcinoma; T3bNxMx, Stage III or higher	Piroxicam 0.3mg/kg sid. Euthanased 11/10/08 due to gradual inappetance, presumed to be cancer related
12/02/08 84	Mast Cell Tumours	Chota Besson 10yo Mn Jack Russell terrier	Completely excised grade 2 mast cell tumour left thorax	CBC, Biochemistry, U/A; abdominal ultrasound; bone marrow aspirate	MCT Grade 2; T1N0M0; Stage 0a or less	Vinblastine x 8; prednisolone. No recurrence as of October 2008
12/02/08 85	Mast Cell Tumours	Zed Coll 8yo Mn Bull terrier cross	Incompletely excised grade 2 mast cell tumour left foreleg	CBC, Biochemistry; FNA left prescapular node; abdominal ultrasound	MCT Grade 2; T1N0M0; Stage 0a	Vinblastine x 8; prednisolone. No recurrence as of September 2008
13/02/08 86	Mast Cell Tumours	Brains Thornett 5yo Mn miniature Schnauzer	Two completely excised grade 1 mast cell tumours: one right rump and one right shoulder	FNA right prescapular node; abdominal ultrasound; bone marrow aspirate	MCT Grade 1; T1(2)N0M0; Stage IIIa	No further treatment required. No recurrence as of August 2008
14/02/08 87	Tumours of the Intestinal Tract	Mac Boland 12yo Fn West Highland White terrier	3 month history of tenesmus and mucoid diarrhea; endoscopic biopsy diagnosed colonic carcinoma	None	Colonic carcinoma; T1NxMx	Piroxicam and high fibre diet. Lost to follow up

14/02/08 88	Lymphosarcoma	Bronson Spargo 13yo Mn Burmese cat	Weight loss, enlarged kidneys, FNA of kidney suggestive of lymphoma; also has diabetes mellitus and grade II/VI parasternal heart murmur	Thoracic radiographs; CBC, Biochemistry, U/A	Renal Lymphosarcoma; Stage II or higher	Intravenous fluids for 24 hours before commencing UW-25. Recurrence of disease April 2008 and euthanased; received 7/16 treatments
15/02/08 89	Soft Tissue Sarcoma	Lucy Ross 8yo Fn Dalmatian	Rapidly growing mass on left cranial thoracic wall; biopsy = undifferentiated sarcoma	CBC, Biochemistry, U/A	Undifferentiated sarcoma, Grade 3; T2bNxM0, Stage III	VAC protocol. Disease progression and unable to control pain; euthanased 21/3/08
18/02/08 90	Tumours of the Skeletal System	Chase Fewster 10yo Fn Ridgeback cross	Lytic bone lesion right distal femur; 5cm firm mass adjacent right side of rectum	Thoracic radiographs, abdominal ultrasound	Open; T2Mx	Doxorubicin x 2, carboplatin x 4. No response after first Doxorubicin; owners ceased treatment for financial reasons; euthanased March 2008
18/02/08 91	Tumours of the Skin and Subcutaneous Tissues	Boadie Young 8yo Fn Staffordshire bull terrier	Excisional biopsy of 2 masses on ventrum	Thoracic radiographs; abdominal ultrasound	Squamous Cell Carcinoma; T0NxM0	Referred for more aggressive surgical excision. Complete excision, no further treatment required
19/02/08 92	Tumours of the Skeletal System	Bob Hale 13yo Mn Kelpie	Horner's syndrome left side; coughing and dyspnoea; cranial mediastinal mass on plain radiographs	CT scan head, thorax, abdomen	Extensive, right sided thoracic mass, with an associated aggressive monostotic bone lesion of the right 5th rib; T1Mx	Owner declined biopsy; palliated with prednisolone, etamiphylline, codeine. Died 6/3/08 likely as a result of tumour
19/02/08 93	Mast Cell Tumours	Simba Slattery 7yo M Bull mastiff cross	Incompletely resected Grade 3 mast cell tumour lateral right thigh; abdominal ultrasound and regional node aspirate negative for metastatic disease	None further	MCT Grade 3; T2N0M0; Stage Ia	Vinblastine, Lomustine, prednisolone. Neutropenic sepsis post first Lomustine; required dose reduction; completed protocol with no further concerns; no evidence of tumour recurrence as of December 2008.
20/02/08 94	Lymphosarcoma	Tank Beven 10yo M Bull terrier cross	Generalized lymphadenopathy; bilateral uveitis and chemosis; ulcerated anus	CBC, Biochemistry, U/A; node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Diffuse, high grade, large cell, B cell lymphosarcoma; Stage IVa	UW-19; chloramphenicol ophthalmic ointment. Didn't achieve complete remission; received 8/16 doses then euthanased due to disease progression
21/02/02 95	Hepatic Tumours	Sally Smith 11yoFn Cocker spaniel cross	Lethargy and inappetance; multiple hepatic masses detected on abdominal ultrasound; moderate, poorly regenerative anaemia; moderate neutrophilia	None further	Open; T1(m)NxMx	Palliation: ranitidine, 'liver diet'. Last seen March 2008 and was deteriorating at that time; then lost to follow up.
21/02/02 96	Lymphosarcoma	Weatos Mills 7yo F Mastiff cross	Generalized lymphadenopathy for 3 months	CBC, Biochemistry, U/A; node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Diffuse, low grade, small cell, T cell lymphosarcoma; Stage IIIa	UW-19. Received 5/16 treatments but didn't receive complete remission. Owner stopped further treatment; dog still well as of 24/9/08
21/02/02 97	Hepatic Tumours	Belle Cornish-Smith 11yo Fn Golden retriever	Lethargy and inappetance; multiple hepatic masses detected on ultrasound; mild anaemia and neutropenia on recent CBC; proteinuria with no active sediment	CBC, Biochemistry, U/A; ultrasound-guided liver biopsy.	Hepatocellular adenoma, T1N0M0;	None. Owner elected euthanasia due to rapid clinical deterioration suspected unrelated to the hepatic mass
22/02/08 98	Tumours of the Male Reproductive System	George Vicary 7yo Mn Golden retriever	Resected Sertoli cell tumour, detected at routine vaccination	CBC, abdominal ultrasound, thoracic radiographs	Sertoli cell tumour; T2N0M0	No further treatment required. Last seen March 2008 before heading back to the UK
25/02/08 99	Lymphosarcoma	Tex Edwards 9yo Mn Kelpie cross	Single enlarged right inguinal node removed for histopathology and IHC	CBC, abdominal ultrasound	Diffuse, low grade lymphocytic lymphoma; negative CD3, weakly positive CD79a, strongly positive CD20 – possible marginal zone lymphoma; Stage IIa	UW-19. Lost to follow up

25/02/08  100	Lymphosarcoma	Coco Harmsworth 17yo DSH cat	Intracranial disease signs – circling to right side, hypersalivation, bilaterally enlarged pupils, absent PLR; enlarged right cervical lymph node, suggestive of lymphoma on FNA; negative for cryptococcosis, toxoplasma; T4 and blood pressure normal; uncompensated chronic renal failure	FeLV, FIV ELISA – both negative	Suspected CNS lymphoma; Stage Vb	UW-25. Initial clinical improvement; neurological signs recurred and was euthanased 27/06/08
27/02/08  101	Tumours of the Skeletal System	Jupiter Verrall 8yo Mn Mastiff cross	Lame left foreleg; lytic bone lesion proximal left humerus	Jamshidi biopsy; radiographs left humerus; thoracic radiographs; FNA left prescapular node; CBC, Biochemistry.	Osteosarcoma; T2M0	Palliation: carprofen and codeine. Euthanased March 2008 due to inability to control pain
04/03/08 102	Ocular Tumours	William Wallace Attwood 12yo Mn Cairn terrier	Resected third eyelid; histopathology diagnosis of lacrimal gland tumour	CT scan head and thorax	Lacrimal gland carcinoma; T1NxM0	No further treatment. No evidence of recurrence as of December 2008
04/03/08  103	Mast Cell Tumours	Dusty Walker 8yo M Mastiff	Previously resected MCT right lateral thigh (grade unknown); now mass on scrotum, large right inguinal node, mass toe 2 left hind foot	CBC, Biochemistry, U/A; plain radiographs left hind foot; thoracic radiographs; abdominal ultrasound; FNA right medial iliac node; biopsy scrotal mass	MCT Grade 2; T1N1M1; Stage IV; Mass on left hind foot causing bone lysis – separate disease? Owner declined toe amputation for biopsy	Palliation: ranitidine and tramadol. Euthanased May 2008 due to disease progression
05/03/08  104	Hepatic Tumours	Rusty Salleo 13yo Fn Kelpie cross	PU/PD, marked increased ALT and ALP, solitary hepatic mass visualized on abdominal ultrasound	Ultrasound guided FNA; CBC, Biochemistry, U/A; UPCR; CT scan thorax and abdomen	Hepatocellular adenoma; T1(m)N0M0	Referred for surgical excision of mass. Complete excision of mass; repeat CT scan 3 months later diagnosed a small mass adjacent lower oesophageal sphincter; endoscopic biopsy non-diagnostic; later developed aggressive acanthomatous epulis.
06/03/08 105	Haemangiosarcoma	Eva Fischer 13yo Fn German Shepherd	Post splenectomy after ruptured mass; 2 red nodules also visualized on liver but not biopsied during surgery	CBC, Biochemistry, U/A	Splenic Haemangiosarcoma; T2N0M1, Stage III	Doxorubicin every 3 weeks x 6. Haemabdomen developed again 2 weeks after first Doxorubicin and dog euthanased
10/03/08  106	Lymphosarcoma	Millie Matthews 4yo Fn Miniature schnauzer	Generalized lymphadenopathy, hepatosplenomegaly; FNA diagnosis of lymphoma	CBC, Biochemistry, U/A; node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Centroblastic, B cell lymphoma; Stage IVa	HDC-BMT. Disease recurrence September 2008; commenced rescue chemotherapy following UW-19 protocol; entered remission quickly again
13/03/08  107	Lymphosarcoma	Cleveland Di Giovanni 11yo Mn Blue Heeler	Generalized lymphadenopathy, hepatosplenomegaly; marked lymphocytosis	CBC, bone marrow aspirate, node biopsy for histopathology and IHC	Lymphoblastic, T cell lymphoma; Stage Va	UW-19. Only achieved partial remission; developed progressive disease and neurological signs and was euthanased 12/9/08
14/03/08  108	Tumours of the Skeletal System	Ky Radford 8yo Mn Akita	Lame left foreleg for 2 months and swollen left carpus; mixed lytic and proliferative lesion distal radius seen on plain radiographs	None	Open; T2M0	Owner declined further diagnostics and elected palliation with Previcox; 2 doses of pamidronate also given 6 weeks apart. Lost to follow up
17/03/08  109	Mast Cell Tumours	Danny Lebreton 10yo Mn Kelpie	1cm diameter grade 2 (low grade) MCT on penis diagnosed with incisional biopsy for histopathology and toluidine blue staining	Abdominal ultrasound	MCT Grade 2 (low grade); T1N0M0; Stage 1a	None. Owner declined further diagnostics and treatment; lost to follow up

110 17/03/08	Endocrine Tumours	Buster Huntley 7yo M Heeler cross	PU/PD, diagnosed with hyperadrenocorticism via ACTH stimulation test; abdominal ultrasound detected large mass within mesentery	CT scan brain, thorax and abdomen	Fat with diffuse interstitial haemorrhage.	Started trilostane for hyperadrenocorticism; Once hyperadrenocorticism controlled, was referred for exploratory laparotomy and mass excision. Biopsy comment: the process is chronic and ongoing. Suggestive of haemorrhagic diathesis, i.e. congenital or acquired coagulopathy. Owner declined further workup. Last seen November 2008 for ACTH stimulation test and dog is well
111 18/03/08	Tumours of the Skin and Subcutaneous Tissues	Jordy Shillington 14yo Mn DSH cat	Bilateral ocular squamous cell carcinoma with main lesion right medial canthus; nose unaffected	None	Squamous cell carcinoma	Referred for surgical excision. Complete excision achieved and no further treatment required
112 18/03/08	Cancer of the Nasal Planum	Benson Visse 12yo Mn DSH cat	5 month history of non healing wound over the nasal planum; biopsy confirmed squamous cell carcinoma	CBC, Biochemistry, U/A; thoracic radiographs; FNA left submandibular lymph node	Squamous cell carcinoma	Complete nasal plane excision. Last seen June 2008 and there was no clinical evidence of disease recurrence
113 19/03/08	Renal Cancer	Chloe Cunliffe 10yo F Maltese cross	Haematuria and stranguria; cavitary mass around right kidney visualized on ultrasound, as were large haematomas within bladder	None	Open; T3N0Mx	None. Verbal report from owner 2 months after presentation was that dog clinically well and haematuria had reduced; then lost to follow up
114 20/03/08	Soft Tissue Sarcoma	Sally Lobban 12yo FN Samoyed	8cm diameter raised mass over left hock; cytological diagnosis of soft tissue sarcoma	CBC, biochemistry, U/A; thoracic radiographs	Soft tissue sarcoma, Grade 2; T2aNxM0, Stage II	Referred for marginal excision; then metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. No recurrence of disease when last examined October 2008
115 25/03/08	Tumours of the Skeletal System	Gary Poric 8yo M Rottweiler	2 week history of right foreleg lameness; proliferative lesion seen on radiographs of right humerus	Repeat radiographs of right humerus; Jamshidi biopsy of bone lesion	Osteosarcoma; T1Mx	Palliation: carprofen 2mg/kg daily and codeine 1mg/kg bid. Owner declined more intensified analgesia and elected euthanasia 4 weeks after initial presentation
116 25/03/08	Tumours of the Skeletal System	Gorm Dickenson 8yo F Irish Setter	6 week history of lameness left hindleg; painful, firm swelling distal left femur	Radiographs left femur and thorax	Open	Owner declined further diagnostics and treatment. Euthanased 25/3/08
117 26/03/08	Histiocytic Sarcoma	Sasha Peterson 9yo Fn Pittbull terrier cross Rottweiler	Episodes of acute pain not localized; solitary lung mass seen on radiographs; palpable abdominal mass on examination	CT scan thorax and abdomen; CBC, biochemistry; PT/PTT; FNA hepatic mass	Histiocytic Sarcoma - disseminated	Lomustine every 3 weeks x 8; codeine and carprofen for analgesia. Euthanased 5/6/08 due to disease progression
118 26/03/08	Leukaemias and Myeloproliferative Disorders	Vicky Callahan 11yo Fn Welsh Springer spaniel	Weight loss and vomiting for 1 month; lymphocytosis detected on CBC	Bone marrow aspirate and repeat CBC	Chronic Lymphocytic Leukaemia; Stage Vb	Chlorambucil at 0.2mg/kg sid for 14 days, then 0.1mg/kg sid until stable, then 0.1mg/kg eod; Prednisolone 1mg/kg sid for 14 days, then 0.5mg/kg sid then 0.5mg/kg eod. Developed progressive, non-regenerative anaemia, then Generalized lymphadenopathy and hepatosplenomegaly; owner elected euthanasia 21/6/08
119 28/03/08	Lymphosarcoma	Cindy Jensen 13yo Fn Tonkinese	Weight loss and vomiting for 3 months; thickened small intestine detected on ultrasound	None	Open – suspected lymphoma	None. Lost to follow up
120 31/03/08	Mast Cell Tumour	Nuno Basic 7yo M Boxer	Mass on ventrum, just cranial to prepuce; FNA suggests MCT	Mass biopsy for grading; abdominal ultrasound, bone marrow aspirate; CBC, Biochemistry, U/A	MCT Grade 2; T2N0M0; stage 1a	Owner declined definitive treatment. Lost to follow up

01/04/08 121	Lymphosarcoma	Jessica Jane Holland 12yo Fn Bull terrier cross	Multiple subcutaneous masses; histopathology suggested lymphosarcoma	IHC on submitted mass; histopathology and IHC on another 3 masses; thoracic radiographs; abdominal ultrasound; FNA hepatic mass	Lymphosarcoma, CD3 and CD79a negative; Stage Ia; hepatocellular carcinoma	UW-19. Entered clinical remission within first cycle but developed disease recurrence during 4 <sup>th</sup> cycle; owner stopped further treatment. Dog deteriorated clinically 2 months later and owner elected euthanasia
03/04/08 122	Lymphosarcoma	Daisy Perrin 9yo Fn golden retriever	Generalized lymphadenopathy noticed overnight	CBC, Biochemistry	Lymphosarcoma; Stage IIIa or higher	UW-19. Complete protocol with no concerns; still in clinical remission October 2008
04/04/08 123	Cancer of the Nasal Planum	Tom Tomkins 11yo Mn DSH cat	Ulcerated nasal planum for 8 months	FNA right submandibular lymph node; thoracic radiographs; CBC, Biochemistry, U/A	Squamous cell carcinoma	Electrochemotherapy. Marked reduction in nasal planum ulceration 5 weeks post procedure; small area ventrally not fully healed; recommended repeat treatment but owner declined
07/04/08 124	Haemangiosarcoma	Honey Gimondo 12yo Fn Norwegian Elkhound	Post splenectomy after ruptured splenic mass; solitary hepatic mass also excised	None	Haemangiosarcoma; T2N0M1; Stage III	Doxorubicin every 3 weeks x 6
07/04/08 125	Haemangiosarcoma	Abby Melbardis 9yo Fn Rhodesian ridgeback	Post splenectomy after ruptured splenic mass	Chest radiographs, cardiac troponin I; CBC	Haemangiosarcoma; T2N0M0; Stage II	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Recurrence of haemabdomen 1/5/08; euthanased
08/04/08 126	Lymphosarcoma	Elmo Fitzpatrick 12yo Mn Staffordshire bull terrier	Generalized lymphadenopathy; occasional circulating abnormal lymphoblasts	None	Lymphosarcoma; Stage IIIa or higher	Lomustine every 3 weeks x 6; prednisolone 2mg/kg daily for 7 days, then tapered
09/04/08 127	Mast Cell Tumours	Jake Williams 10yo Mn Golden retriever	Primary mass on LFL resected 7 months prior; now recurrence at site, satellite masses and regional node involvement	CBC, Biochemistry, U/A; FNA satellite masses and node; abdominal ultrasound; bone marrow aspirate	Mast cell tumour; rT2N1bM0; Stage IIIa	Palliation: prednisolone, omega 3 fish oils, antihistamines and gastric mucosal protectants as needed.
11/04/08 128	Soft Tissue Sarcomas	Chloe Jennings-White 10yo Fn Schipperke	Mass over left rump; incisional biopsy diagnosis of grade 3 haemangiopericytoma	Thoracic radiographs; abdominal ultrasound	Haemangiopericytoma, Grade 3; T2bN0M0, Stage III	Metronomic chemotherapy: 10mg/m2 CTX, 0.3mg/kg piroxicam for life
11/04/08 129	Tumours of the Mammary Gland	Mia Layton 7yo Fn Kelpie cross	Post excision of left mammary glands 3-5; chest radiographs NSF	CBC, Biochemistry, U/A; abdominal ultrasound	Mammary ductular adenocarcinoma; incomplete excision	Referred for caudal mastectomy
14/04/08 130	Lymphosarcoma	Sasha Tucker 10yo Fn Golden retriever	Generalized lymphadenopathy; marked thrombocytopenia, lymphocytosis	None	Stage V lymphosarcoma vs. acute lymphoblastic leukaemia	Owner declined further diagnostics and treatment; prednisolone commenced as palliation (2mg/kg then tapered)
15/04/08 131	Tumours of the Skeletal System	Max Connolly 10yo Mn Rottweiler	Post amputation of left hindleg; 3 small pulmonary nodules on thoracic CT scan	None	Osteosarcoma; TxM1	Doxorubicin x 2 a fortnight apart, then carboplatin x 4 every 3 weeks
16/04/08 132	Lymphosarcoma	Maddi Young 11yo Fn Golden retriever	Generalized lymphadenopathy; hepatosplenomegaly; weight loss	CBC, Biochemistry, U/A; node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Diffuse, large cell, low grade B cell lymphoma; Stage IVb	UW-19. Completed one cycle of treatment and nodes reduced to normal range; hepatosplenomegaly was still palpable and clinically dog was unwell. Owner declined repeat imaging and elected euthanasia
16/04/08 133	Lymphosarcoma	Storm Barnard 10yo M Doberman cross	Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma	2 x doxorubicin given then owner declined further treatment for financial reasons
17/04/08 134	Tumours of the Skeletal System	Buundi Crawford 11yo Mn Ridgeback cross	Amputated left hindlimb with diagnosis of osteosarcoma; chest radiographs clear of metastatic disease	None	Osteoblastic osteosarcoma; T0M0	2 x doxorubicin, then 4 x carboplatin

18/04/08 135	Tumours of the Skeletal System	Jake Buckingham 6yo Mn Rottweiler	Lytic proliferative lesion of distal left femur on radiographs	Jamshidi biopsy of lesion; chest radiographs; abdominal ultrasound; CBC, Biochemistry, U/A	Open – biopsy sample unlikely representative of the lesion, reactive bone only	Referred for amputation of limb; routine pelvic radiographs prior to procedure found lytic lesion of right ischium. Euthanased
23/04/08 136	Tumours of the Endocrine System	Shadow Graystone 15yo Mn miniature Fox terrier	Polyuria, polydipsia, polyphagia. Adrenal mass noted on abdominal ultrasound	ACTH stimulation test	Functional adrenal tumour	Referred for surgical resection but owner later declined.
23/04/08 137	Cancer of the Oral Cavity	Roxy Langdon 3yo Fn Collie cross	Solitary mass adjacent lingual side of left lower canine tooth	CT scan	Acanthomatous epulis	Referred for surgical excision. Unilateral rostral mandibulectomy performed achieving complete excision; good recovery and no further treatment required
28/04/08 138	Lymphosarcoma	Bonnie Braithwaite 14yo Fn Blue Heeler cross	Generalized lymphadenopathy; FNA diagnosis of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	Palliation: prednisolone 2mg/kg daily, tapering
29/04/08 139	Lymphosarcoma	Henry Willoughby 7yo Mn Cocker spaniel	Generalized lymphadenopathy; FNA diagnosis of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	None. Owner declined further treatment.
29/04/08 140	Cancer of the Oral Cavity	Whitnee Mohen 11yo Fn Bearded collie	Recurrent mass left mandible, adjacent PM 3	CT scan	Acanthomatous epulis	Referred for surgical excision. Complete resection of mass and excellent recovery; no further treatment required
30/04/08 141	Lymphosarcoma	Austin Kirkland 9yo Mn Border collie	One week history of lethargy and inappetance. Ascites developed and CT scan showed abnormal liver and spleen. Splenectomy = infarcted. Liver biopsy = B-cell lymphoma	CBC, Biochemistry, U/A; marrow aspirate	Hepatic lymphoma, B-cell	UW-19. Recurrence September 2010 and euthanased.
01/05/08 142	Mast Cell Tumours	Gracie Butcher 10yo Fn Staffordshire bull terrier	Mass on head present 2 years with minimal change; mass on right flank present 2 months but recent growth; FNAs of both suggestive of mast cell tumours	Excisional biopsy of both masses; CBC, biochemistry, U/A	MCT x 2, Grade 1-2; T1NxMx; Stage IIIa	Owner declined further diagnostics and treatment
02/05/08 143	Tumours of the Mammary Gland	Lily Chew 9yo F golden retriever cross	Resected mammary adenocarcinoma; complete excision but carcinoma cells within lymphatics	CT scan thorax and abdomen	Mammary Ductular Adenocarcinoma; T0N0M0, Stage 1	Doxorubicin every 2 weeks x5
05/05/08 144	Mast Cell Tumours	Thor Honti 6yo M Staffordshire bull terrier	Clean, but close, resection of 3 low/intermediate grade MCTs; new lesion on scrotum	Fine needle aspirate of scrotal lesion	MCT Grade 1-2; T1NxMx; Stage IIIa	Owner declined further treatment.
05/05/08 145	Tumours of the Endocrine System	Peppy Knox 13yo Fn DSH	Polyphagia, polyuria, polydipsia	CBC, Biochemistry, U/A; TT4	Hyperthyroidism	Discharged back to referring vet for ongoing management
07/05/08 146	Urinary Bladder Cancer	Jazz Rogers 9yo Mn Cocker spaniel	Single episode of haematuria and stranguria; abdominal ultrasound found mass in bladder trigone	Cystoscopy and biopsy; chest radiographs; lateral lumbar spinal radiograph; CBC, Biochemistry	Carcinoma; TNM	Mitoxantrone every 3 weeks x 6; piroxicam 0.3mg/kg. Repeat ultrasound after 2 cycles showed stable disease; protocol changed to carboplatin q3wks x 6; repeat ultrasound after 2 cycles showed mild disease progression and owner declined further treatment
08/05/08 147	Soft Tissue Sarcomas	Ettie Murray 12yo Fn Labrador cross	Incompletely resected soft tissue sarcoma (intermediate grade) from lateral right carpus	None	Soft tissue sarcoma, Grade 2; T1aNxMx, Stage I or higher	Owner declined further diagnostics and treatment
08/05/08 148	Lymphosarcoma	Bess Buscumb 16yo Fn Border collie cross	Left eye uveitis and hypopyon; mild enlargement of submandibular and prescapular nodes; 7 days prednisolone prior	CBC, Biochemistry; FNA submandibular and prescapular nodes	Lymphosarcoma	Palliation – prednisolone when required
09/05/08 149	Mast Cell Tumours	Rolly Armstrong 10yo Mn Shar Pei	Incompletely resected grade 2 (low grade) mast cell tumour between toes 3 and 4 left fore foot	CBC, Biochemistry, U/A; FNA left prescapular node; abdominal ultrasound	MCT, Grade 2 (low grade); T1N0M0; Stage Ia	Vinblastine x 8; prednisolone



09/05/08 150	Tumours of the Skin and Subcutaneous Tissues	Maggie Gardiner 9yo Fn DSH cat	Recurrent left pinna ulcerated lesion	None	Squamous cell carcinoma, intermediate differentiation;	Referred for complete excision of pinna and vertical canal. Complete excision achieved; excellent prognosis
12/05/08 151	Lymphosarcoma	Rusty Edwards 5yo M Cattle dog	Generalized lymphadenopathy; FNA diagnosis of lymphoma	CBC, Biochemistry, U/A; biopsy right prescapular node for HP and IHC; abdominal ultrasound; marrow aspirate	Lymphoma, Diffuse, large cell, intermediate grade, T-cell rich B cell	HDC-BMT; recurrence treated with alternating doxorubicin and Lomustine. Euthanased December 2009.
12/05/08 152	Cancer of the Salivary Glands	Saldums Bernsteins 14yo Fn Poodle cross	Mass over right side of neck noted 3 weeks ago and now having difficulty swallowing.	Incisional biopsy	Salivary adenocarcinoma	None. Owner declined further staging of the disease
13/05/08 153	Tumours of the Skin and Subcutaneous Tissues	Maggie Fox 11yo Fn Jack Russell terrier	Grade 2 fibrosarcoma incompletely resected from right antebrachium	None	Fibrosarcoma, grade 2	None. Owner declined further diagnostics and treatment.
14/05/08 154	Cancer of the Oral Cavity	Jack Britton 14yo Mn Fox terrier	Presented to referring vet 2 weeks prior for dental prophylaxis; abnormal bone over upper left canine tooth noted and radiographs revealed lytic bone lesion	CBC, biochemistry, U/A; CT scan head and thorax; incisional biopsy of jaw lesion	Squamous Cell Carcinoma	Palliation – pamidronate, codeine, carprofen; initial good response so administered Carboplatin and Gemcitabine; achieved partial remission but dog deteriorated clinically and was euthanased
14/05/08 155	Tumours of the Skin and Subcutaneous Tissues	Gus Lau 6yo Mn Rottweiler	Completely resected mass from right mid antebrachium	CBC, Biochemistry, U/A; FNA R prescapular and axillary nodes; chest radiographs x 3	Cutaneous malignant melanoma	Carboplatin x 6
16/05/08 156	Lymphosarcoma	Jasmine Lee 12yo Fn Golden retriever	Collapse; ascites; Generalized lymphadenopathy	FNA lymph nodes; abdominal ultrasound	Suspected lymphoma; Stage IIb	None. Owner elected euthanasia
19/05/08 157	Mast Cell Tumours	Buster Buckland 5yo M Boxer	18 months prior had low/intermediate grade mast cell tumour excised with close margins from left hindleg; one month ago had intermediate/high grade mast cell tumour incompletely excised from ventrum	Abdominal ultrasound	MCT, Grade 2 (high grade); T2NxM0; Stage Ia	None
20/05/08 158	Tumours of the Endocrine System	Poppy Thrasyvoulou 12yo Fn Maltese cross	Resected mass from right ventral neck; histopathologic diagnosis of thyroid carcinoma	Ventral cervical ultrasound; abdominal ultrasound; chest radiographs; Fine needle aspirate of mass in right ventral neck seen on ultrasound	Thyroid carcinoma	Referred for surgical excision of right thyroid mass, followed by adjuvant doxorubicin q3wks x 6
21/05/08 159	Lymphosarcoma	Buddy Lawrence 14yo Mn crossbreed	Generalized lymphadenopathy; FNA suggests lymphoma	CBC, Biochemistry, U/A	Lymphoma; Stage IIIa or higher	UW-19
22/05/08 160	Lymphosarcoma	Jess Broom 6yo Fn Border collie	Generalized lymphadenopathy; FNA suggests lymphoma	Node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Lymphoma	HDC-BMT
22/05/08 161	Mast Cell Tumours	Tammy Stiglmayer 9yo Fn silky terrier cross	Recurrence of mass on ventral chest with satellite nodule; initial lump then sent for histopathology = high grade mast cell tumour	None	MCT, high grade; T2N1Mx; Stage IIa	Palliation: prednisolone, chlorpheniramine, ranitidine, omega-3 fatty acids
23/05/08 162	Lung Cancer	Tess West 13yo Fn Sheltie	Increased coughing in last 5 weeks; chest radiographs suggest solitary mass in caudal left lung lobe	None	Solitary pulmonary mass	Palliation – codeine 1mg/kg bid; carprofen 1mg/kg bid
27/05/08 163	Lymphosarcoma	Jessica Mallett 11yo Fn Blue Heeler	Generalized lymphadenopathy; FNA suggests lymphoma	None	Lymphoma; Stage IVa or higher	Owner declined further diagnostics; oral cyclophosphamide given every 4 weeks. Euthanased 04/08/08
28/05/08 164	Soft Tissue Sarcomas	Thomas Rees 13yo Mn Poodle cross	Incompletely resected low grade soft tissue sarcoma on right carpus	CBC, Biochemistry, U/A; chest radiographs; regional node FNA	Haemangiopericytoma, Grade 1; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life

165	28/05/08	(Lymphosarcoma)	Sasha Clarke 6yo Fn German shepherd	Lethargy, pyrexia and weight loss; subsequent lymphadenopathy	Node biopsy for histopathology and IHC	Subacute to chronic, moderate pyogranulomatous inflammation; IHC shows mixed T and B cell population; stains negative for fungi and mycobacteria	Dog responded to amoxicillin-clavulanic acid
166	29/05/08	Mast Cell Tumours	Fletcher Henry 2yo Mn golden retriever	Fine needle aspirate diagnosis of mass in left inguinal skin fold	Abdominal ultrasound	Mast cell tumour	Referred for aggressive surgical resection as diagnostic and therapeutic procedure. Complete excision achieved; no adjuvant therapy administered
167	29/05/08	Tumours of the Skeletal System	Pig Humphries 6yo M Greyhound cross	Very proliferative bone lesion of distal left radius	Chest radiographs x 3; pelvic radiographs; fine needle aspirate of lesion; fine needle aspirate of left prescapular node	Sarcoma	Amputation of left foreleg, including left prescapular node. Recurrence of disease 1/8/08 confirmed with thoracic radiographs; euthanased 04/08/08
168	30/05/08	Mast Cell Tumours	Jimmy French 3yo Mn golden retriever	Incompletely resected intermediate grade MCT over left shoulder	Fine needle aspirate regional node; CBC, biochemistry, U/A	Mast cell tumour, grade 2 (low grade); T2N0Mx; Stage Ia	Vinblastine x8; prednisolone
169	04/06/08	Soft Tissue Sarcomas	Mollee Andrews 12yo Fn Staffordshire bull terrier	Incompletely resected intermediate grade soft tissue sarcoma on the ventrum; incompletely resected low grade haemangiopericytoma on the right antebrachium	Thoracic radiographs; FNA right prescapular lymph node; CBC, biochemistry, U/A	Haemangiopericytoma, Grade 1; T1a(2)N0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
170	05/06/08	Tumours of the Skin and Subcutaneous Tissues	Dana McCreadie 13yo Mn Blue heeler	Incomplete resection of recurrent mass on dorsal neck; histopathologic diagnosis of squamous cell carcinoma	CBC, Biochemistry, U/A	Squamous cell carcinoma	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
171	05/06/08	Tumours of the Skeletal System	Alco Ho 7yo M Rottweiler	Amputated left foreleg for proliferative distal radius lesion; histopathologic diagnosis of osteosarcoma	Fine needle aspirate of left prescapular lymph node; pelvic radiographs; left stifle radiographs; CBC, Biochemistry, U/A	Osteosarcoma	Single dose each of doxorubicin and carboplatin
172	06/06/08	Hepatic Tumours	Tess Willes 12yo Fn Labrador cross	Increased respiratory effort at night for 2 weeks; 1 week inappetance and lethargy; liver mass detected on abdominal ultrasound	CBC; PT/PTT; ultrasound guided FNA of hepatic mass; CT scan thorax and abdomen	Hepatocellular carcinoma	Palliation: codeine, metoclopramide, ranitidine. Dog died 10 days after presentation
173	06/06/08	Tumours of the Mammary Gland	Alice Rawlings 13yo Tenterfield terrier	Incompletely resected mammary adenocarcinoma of left gland 4	Chest radiographs; Fine needle aspirate of left inguinal node	Mammary adenocarcinoma, tubulopapillary, grade 2	Gemcitabine weekly x 6; starting dose 800mg/m2 but reduced to 720mg/m2 due to grade 2-3 vomiting; metronomic chemotherapy after systemic course: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Last seen Feb 2009, in complete remission
174	13/06/08	Tumours of the Skeletal System	Cassie Wiburd 9yo Fn Rottweiler	6 week history of lame left foreleg; radiographs show lesion in proximal left humerus; also diagnosed with degenerative myelopathy 12 months ago	CBC, Biochemistry, U/A; radiographs of left humerus; 3 view thoracic radiographs; frog leg pelvic radiograph; FNA left prescapular node; Jamshidi bone biopsy of lesion	Osteosarcoma; T2M0	Owner sought alternative therapies elsewhere. Represented 22/8/08 due to progressive lameness. Prescribed carprofen and tramadol. Added amantadine after 3 weeks. Started pamidronate infusions every 3 weeks. Added gabapentin in November due to progressive pain. Euthanased 3/12/08
175	13/06/08	Mast Cell Tumours	Jake Harmer 14yo Mn Pitt bull terrier cross	Severe lethargy and inappetance; markedly increased liver enzymes; FNA of liver suggested mast cell tumour disease	CBC, biochemistry, U/A; bone marrow aspirate	Hepatic mast cell tumour disease	Single Vinblastine then oral CTX 7 days later; clinical deterioration so palliation with prednisolone, ranitidine, chlorpheniramine, omega-3 fatty acids

17/06/08 176	Perianal Tumours	Jedda Mottram 11yo Fn CKCS	Mass present ventrolateral to anus for 3 weeks; FNA suggestive of perianal adenoma	None	Presumed perianal adenoma	Owner declined further diagnostics and treatment.
18/06/08 177	Cancer of the Oral Cavity	Juma Thomson 12yo M Labrador	Small mass noticed at right commissure of jaw during dental prophylaxis; incisional biopsy taken suggested oral melanocytoma	Thoracic radiographs; fine needle aspirate of right submandibular lymph node	Oral Melanocytoma	Referred for marginal resection of the mass; histopathology showed mild, benign melanocytosis
18/06/08 178	Haemangiosarcoma	Connor Watchorn 8yo Mn German shepherd	Splenic mass and abdominal effusion at referring vet; splenectomy provided histopathologic diagnosis of HSA; thoracic radiographs unremarkable	CBC, Biochemistry, U/A	Splenic Haemangiosarcoma; T2N0M0, Stage II	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Recurrence of haemabdomen 23/7/08; abdominal ultrasound confirmed multiple masses throughout liver and mesentery; euthanased
19/06/08 179	Lymphosarcoma	Jack Eccles 9yo Mn Blue heeler cross	Generalized lymphadenopathy; progressive hindlimb and forelimb paresis/paralysis; brain CT scan NSF, CSF analysis showed mild mixed inflammatory cells; toxoplasma and neospora titres negative	CBC, biochemistry, U/A; bone marrow aspirate	Lymphoma, diffuse, large B cell (Kiel centroblastic); stage IIIb	UW-19. Partial remission of nodes but deterioration of the inflammatory CNS disease; euthanased 04/07/08
19/06/08 180	Lymphosarcoma	Rico Mitton 6yo Mn Kelpie cross	Generalized lymphadenopathy; node histopathology diagnosis of lymphoma	CBC, Biochemistry, U/A; IHC on node biopsy	B cell lymphoma, diffuse intermediate grade; Stage IIIa or higher	UW-19
22/06/08 181	Cancer of the oral cavity	Bentleigh Trevail 11yo M Maltese terrier	Pedunculated mass attached to right upper gum adjacent canine tooth; enlarged right testicle	None	Open	Owner declined further diagnostics and treatment
24/06/08 182	Perianal Tumours	Brutus Bohdan 10yo Mn Staffordshire terrier cross	10cm mass right side of anus with enlarged medial iliac lymph nodes; FNA diagnosis of metastatic apocrine gland adenocarcinoma	Thoracic radiographs	Presumed apocrine gland adenocarcinoma	Neoadjuvant Carboplatin and Gemcitabine followed by surgical excision of primary mass and both medial iliac nodes. Died December 2009 due to disease progression
26/06/08 183	Cancer of the Oral Cavity	Ayesha Chappell 13yo Fn Staffordshire bull terrier	Oral malignant melanoma completely resected from left commissure of the lips	CBC, biochemistry, U/A; CT scan head and thorax; FNA left submandibular lymph node	Malignant melanoma; T1N1M0	Left mandibular lymph node excision followed by adjuvant chemotherapy: carboplatin every 3 weeks x 6
26/06/08 184	Tumours of the Skin and Subcutaneous Tissues	Lady Mansfield 12yo Fn Staffordshire bull terrier cross	Cutaneous malignant melanoma resected from left ear, adjacent external auditory meatus	CBC, biochemistry; Thoracic radiographs; FNA left submandibular lymph node	Malignant melanoma; T1NMx	Lost to follow up
07/07/08 185	Lymphosarcoma	Duke Brinkworth 5yo Mn DSH cat	Caudal abdominal mass; FNA suggests discrete cell neoplasia	None	Open	Owner elected prednisolone trial
07/07/08 186	Tumours of the Skeletal System	Holly Miles 9yo Fn Cocker spaniel	Firm mass between eyes, biopsy diagnosis of osteosarcoma; mildly enlarged left submandibular lymph node	CBC, biochemistry; CT scan head and thorax; FNA left submandibular lymph node	Osteosarcoma; T1M0	Owner declined definitive treatment
07/07/08 187	Cancer of the Salivary Glands	Bolta Geletic 3yo Mn Bull mastiff cross	8cm diameter firm but mobile mass adjacent to the caudolateral right mandible; incisional biopsy diagnosis of salivary gland adenocarcinoma	None	Salivary gland adenocarcinoma	Marginal excision of mass; adjuvant piroxicam 0.3mg/kg daily
08/07/08 188	Mast Cell Tumours	Gus Wood 10yo Mn Staffordshire bull terrier	Multiple previous low grade mast cell tumours; currently mass on caudal left stifle with FNA diagnosis of MCT, and enlarged left inguinal node	Excisional biopsy of popliteal and inguinal masses; CBC, biochemistry, U/A	MCT, Grade 3; T2NxMx; Stage Ia; Inguinal mass – adipose tissue	Lomustine every 3 weeks x 6; prednisolone 2mg/kg daily, tapering. Disease progression warranting euthanasia 21/8/09
08/07/08 189	Soft Tissue Sarcomas	Coola Pahi 8yo Mn Shih Tsu cross	Incompletely excised soft tissue sarcoma from right hind foot	Thoracic radiographs; FNA right popliteal node; CBC, Biochemistry, U/A	Peripheral sarcoma of soft tissue, Grade 1; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. No disease recurrence noted as of January 2009
09/07/08 190	Lymphosarcoma	Mozzie Martin 6yo Fn red heeler cross	Generalized lymphadenopathy of 2 weeks duration	Node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate; CBC, Biochemistry, U/A	Centroblastic B-Cell Lymphoma; Stage IIIa	HDC-BMT. Disease recurrence January 2009; repeat node biopsy and bone marrow aspirate performed

09/07/08 191	Tumours of the Skeletal System	Chevy Chute 9yo Fn Rhodesian ridgeback cross	4/5 lame left hindleg with firm swelling distal to stifle; radiographs showed marked lysis of proximal tibia	None	Open	None. Owner declined further diagnostics and treatment; euthanased 09/07/08
09/07/08 192	Tumours of the Skeletal System	Seppie Bond 12yo Fn Labrador	Large, firm, painful swelling encircling left hock; histopathologic diagnosis of osteosarcoma	None	Osteoblastic osteosarcoma; T1Mx	Pamidronate; carprofen; codeine; no noticeable improvement so analgesia provided with buprenorphine then fentanyl patches. Euthanased 10/08/08 due to intractable pain
10/07/08 193	Soft Tissue Sarcoma	Toby Bejhanovic 6yo Mn Doberman cross	6 month history of enlarging masses in inguinum	Needle core biopsy of smallest mass	Malignant neoplasia, poorly differentiated, likely sarcoma; T2bN1Mx, Stage IV	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Disease progression after one month; euthanased 15/9/08
11/07/08 194	Histiocytic sarcoma	Buddy Mitchell 1yo M Mastiff	Rapidly growing mass on right side of face, histopathology diagnosis of malignant round cell tumour, CD3 and CD79a negative	CT scan head, thorax and abdomen; ultrasound guided FNA of hepatic mass; CBC, biochemistry, U/A.	Disseminated histiocytic sarcoma	Lomustine every 3 weeks x 8. Partial remission achieved for 2 cycles then disease progression; euthanased 10/09/08 due to marked weight loss
14/07/08 195	Tumours of the Skin and Subcutaneous Tissues	Sassy B Macnab 15yo Fn DSH cat	1.5cm ulcerated lesion over external left pinna; several small crusts along right pinna edge	Thoracic radiographs; CBC, Biochemistry, U/A		Referred for aggressive surgical resection of left pinna and less aggressive resection of right pinna
22/07/08 196	Mast Cell Tumours	Molly Everley 5yo Fn Boxer	Intermediate grade MCT removed from left dorsal head; FNA showed metastasis to the left submandibular lymph node	CBC, biochemistry, U/A; abdominal ultrasound; bone marrow aspirate; FNA left prescapular node	MCT Grade 2; T1N1M0; Stage IIa	Excisional biopsy of both the submandibular and prescapular lymph nodes; adjuvant chemotherapy using Vinblastine/Lomustine/prednisolone
22/07/08 197	Tumours of the Endocrine System	Max Jones 12yo Mn Kelpie cross	2 month history of lethargy, inappetance and weight loss; abdominal ultrasound showed nodular pancreatomegaly and right adrenomegaly	None	Open	Owner declined further diagnostics and treatment
23/07/08 198	Nasal Tumours	Coco Lee 13yo Fn Old English Sheepdog	Acute severe epistaxis from right nostril; CT scan suggestive of tumour in right nasal sinuses	None	Open	Carboplatin every 3 weeks x 6; piroxicam 0.3mg/kg daily. Repeat CT scan of nose showed stable disease after one treatment; completed carboplatin protocol (every 3 weeks x 6); then started doxorubicin protocol (every 3 weeks x 6)
25/07/08 199	Soft Tissue Sarcomas	Sabian Freeman 12yo Mn Staffordshire bull terrier	Rapidly growing mass on right side of thorax; FNA suggestive of mesenchymal neoplasia	Incisional biopsy of mass	Soft tissue sarcoma, Grade 1-2; T2bNxMx, Stage III or higher	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
28/07/08 200	Haemangiosarcoma	Basil Panegyres 11yo Mn DSH cat	Splenectomy performed for collapse and haemabdomen; biopsy diagnosed haemangiosarcoma	Thoracic radiographs; echocardiography; CBC	Splenic haemangiosarcoma; T2N0M0, Stage II	VAC protocol
29/07/08 201	Mast Cell Tumours	Roly Marriott 8yo Mn Labrador	High grade mast cell tumour completely excised from left side of ventrum	CBC, biochemistry, U/A; abdominal ultrasound; bone marrow aspirate	MCT, Grade 3; T2N0M0; Stage Ia	Vinblastine/Lomustine/prednisolone protocol. Developed septicemia after first vinblastine dose and owner declined further chemotherapy. Developed new grade 1 MCT on right hindleg. No evidence of recurrence of first MCT.
30/07/08 202	Mast Cell Tumours	Roxy Gribble 4yo Fn Fox terrier	Rapid growth of inguinal mass – high grade mast cell tumour; another mass removed from lateral right hindleg 6 weeks prior (untested)	CBC, Biochemistry; abdominal ultrasound; bone marrow aspirate	MCT, Grade 3; T2N1M1; Stage IVa	Palliation: omega 3 fish oils, prednisolone, ranitidine, chlorpheniramine
31/07/08 203	Mast Cell Tumours	Cadbury Carpenter 10yo Fn Labrador	Marginal resection of high grade mast cell tumour over right thorax	CBC, biochemistry, U/A; abdominal ultrasound; bone marrow aspirate	MCT; grade 3; T2N0M0; Stage Ia	Referred for further excision of primary; adjuvant chemotherapy using Vinblastine/Lomustine/prednisolone protocol

31/07/08 204	Tumours of the Skeletal System	Zack Loos 11yo M Rottweiler cross	Rapidly growing mass near right axillary region; FNA suggestive of malignancy	CBC, biochemistry, U/A; CT scan thorax; needle core biopsy of mass	Malignant mesenchymal tumour; suspect osteosarcoma	Palliation: piroxicam 0.3mg/kg daily
01/08/08 205	Mast Cell Tumours	Stella Finnigan 7yo Fn Labrador	3 year history of mass on left thorax; 4 week history of diffuse swelling of distal right hindleg and enlarged right popliteal node; FNA of this node suggestive of metastatic mast cell tumour	CBC, biochemistry, U/A; FNA mass on left thorax and swelling over dorsal right metatarsals; abdominal ultrasound; bone marrow aspirate	MCT, Grade 3; T2N1M0; Stage IIb	Imatinib 4.4mg/kg daily for 2 weeks, followed by vinblastine/Lomustine/prednisolone protocol
04/08/08 206	Mast Cell Tumours	Stacey McCormick 6yo Fn Labrador	2 week history of mass on lateral left stifle; FNA suggested MCT so wide excision and histopathology performed: grade 2 MCT close margins	FNA left popliteal lymph node	MCT Grade 2; T2N0Mx; Stage Ia	Owner declined further diagnostics and treatment
04/08/08 207	Lymphosarcoma	Syd Goldstone 12yo M Kelpie	One week history of lymphadenopathy; node biopsy confirmed lymphoma; routine blood tests unremarkable but scattered reactive/atypical lymphocytes seen on smear	None	Lymphoma, diffuse intermediate grade immunoblastic; Stage IIIa or higher	Doxorubicin every 3 weeks x 6. No response after 2 treatments so switched to Lomustine; No response after 2 doses so switched to oral CTX; developed sterile haemorrhagic cystitis; dog euthanased 1/12/08
05/08/08 208	Mast Cell Tumours	Lillie Henderson 11yo Fn Jack Russell terrier	Incompletely resected intermediate grade mast cell tumour over right shoulder	FNA right prescapular node	MCT, Grade 2; T1N0Mx; Stage Ia	Owner declined further diagnostics and treatment
06/08/08 209	Mast Cell Tumours	Mattel Baskerville 13yo Mn DSH cat	3 weeks history of vomiting and inappetance; solitary mass in abdomen aspirated as likely mast cell neoplasia	Abdominal ultrasound; guided FNA of mass and liver; CBC; bone marrow aspirate	Mast cell tumour attached to mesentery, with hepatic involvement	Referred for surgical excision. Non-resectable mass therefore biopsies taken; died post operatively from hypotension
06/08/08 210	Urinary Bladder Cancer	Heidi Goh 12yo Fn German shorthaired pointer	3 month history of urinary incontinence then developed stranguria and haematuria; abdominal ultrasound diagnosed mass in trigone region of bladder	CBC, biochemistry, U/A (no culture as on ABs); thoracic and lumbar spine radiographs; cystoscopy and guided biopsies	Carcinoma, locally invasive (likely transitional cell carcinoma); solitary consolidated pulmonary mass in left cranial lung lobe	Mitoxantrone every 3 weeks x 6; piroxicam. Repeat ultrasound after 2 cycles showed stable disease; switched to Carboplatin and Gemcitabine every 3 weeks; minimal clinical improvement after 2 cycles and dog developed neurological disease and was euthanased December 2008
07/08/08 211	Lymphosarcoma	Koko Newman 6yo Fn Boxer	Generalized lymphadenopathy; fine needle aspirate cytology suggestive of lymphoma	Node biopsy for histopathology and IHC; bone marrow aspirate; CBC, biochemistry, U/A	Lymphoma, diffuse, large, T-cell phenotype; stage Va	UW-19 with 5 day cytosine arabinoside CRI during the first week. Disease recurrence 1/12/08; owner declined rescue protocol and elected euthanasia
08/08/08 212	Perianal Tumours	Bonnie Jones 14yo Fn Staffordshire bull terrier cross	4cm diameter mass noted near left anal gland one month prior; mild progression to now; excisional biopsy diagnosed undifferentiated adenocarcinoma	Thoracic radiographs, abdominal ultrasound; FNA enlarged left medial iliac node	Undifferentiated adenocarcinoma	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
08/08/08 213	Tumours of the Skeletal System	Harley Hyland 11yo Mn Corgi cross	Firm swelling over right dorsal skull noticed a week ago; skull radiographs showed discrete boney lesion	CT scan head and thorax; incisional biopsy of mass; CBC, Biochemistry, U/A	Multilobular tumour of bone	Monitoring only
11/08/08 214	Haemangiosarcoma	Roxy Pepper 5yo Fn Kelpie cross	One month history of swelling over right lateral stifle; excisional biopsy = haemangiosarcoma	CBC, biochemistry, cardiac troponin I, thoracic radiographs, abdominal ultrasound	Invasive subcutaneous haemangiosarcoma	VAC protocol
11/08/08 215	Soft Tissue Sarcomas	Meggie Bacich 12yo Fn German shepherd cross	12 month history of mass on left shoulder with rapid growth in the last 4 weeks; excisional biopsy = haemangiopericytoma, grade 2, incomplete excision	CBC, Biochemistry, U/A; FNA left prescapular lymph node; thoracic radiographs	Haemangiopericytoma, Grade 2; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life

12/08/08 216	Cancer of the Oral Cavity	Jessie Peacock 10yo Mn DSH	One month history of ulcerative lesion on the hard palate, non responsive to corticosteroids; incisional biopsy = high grade fibrosarcoma	CBC, Biochemistry, U/A; CT scan head and thorax	Fibrosarcoma, high grade	Electrochemotherapy followed by metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
13/08/08 217	Haemangiosarcoma	Storm O'Keefe 7yo Fn German shepherd	Acute onset lethargy; exploratory laparotomy for haemabdomen found bleeding splenic mass; splenectomy = haemangiosarcoma	None	Haemangiosarcoma; T2NxMx; Stage II or higher	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Recurrence of haemabdomen 2 months after initial presentation; euthanased
13/08/08 218	Mast Cell Tumours	Connan Luculano 10yo Mn Pitt bull terrier	Mass on right hindleg 3-4 years; excisional biopsy = mast cell tumour, grade 2 (low grade); also complete excision of a cutaneous haemangiosarcoma from prepuce	None	MCT Grade 2 (low grade); T1NxMx; Stage Ia	Owner declined further diagnostics and treatment
14/08/08 219	Hepatic Tumours	Molly Gibson 12yo Fn Golden retriever	One week history of lethargy, inappetence, vomiting, diarrhea and PU/PD; initial abdominal ultrasound showed multiple hepatic masses, enlarged mesenteric nodes and hypoechoic pancreas	CBC, biochemistry, PT/PTT; repeat abdominal ultrasound; FNA solitary hepatic mass seen on ultrasound; thoracic radiographs	Hepatic carcinoma	Supportive therapy with IVF. Vomiting and diarrhea resolved; appetite returned but remained weak; dog died suddenly at home 3 days later
15/08/08 220	Lymphosarcoma	Panther Coles 18yo Mn DMH	One week history of mass on lateral right hock; FNA inconclusive but suggestion of round cell tumour	CBC, Biochemistry, U/A; T4; Thoracic radiographs; abdominal ultrasound; incisional biopsy of mass	Poorly differentiated round cell neoplasm; likely histiocytic or lymphocytic origin.	Owner declined further treatment
18/08/08 221	Nasal Tumours	Molly Laurie 9yo Fn Old English Sheep Dog	3 month history of snoring, snorting then sneezing and now 2 bouts of epistaxis; nasal cavity radiographs showed soft tissue density caudal right nasal cavity	CBC, biochemistry, U/A; CT scan of head and thorax; rhinoscopy; blind biopsies	Poorly differentiated sarcoma	Carboplatin, doxorubicin, piroxicam
18/08/08 222	Lymphosarcoma	Beau Elliott 12yo Mn Staffordshire bull terrier cross	Generalized lymphadenopathy; fine needle aspirate cytology suggestive of lymphoma	CBC	Lymphosarcoma; Stage IIIa or higher	Oral cyclophosphamide (270mg/m2) every 4 weeks
19/08/08 223	Mast Cell Tumours	Murray McWaters 5yo Mn Staffordshire bull terrier	Grade 2 (Low grade) mast cell tumour completely excised from scrotum; another lesion still present adjacent to it	FNA lesion on scrotum; abdominal ultrasound	MCT Grade 3; T1N0M0; Stage Ia	Referred for wide excision and histopathology
19/08/08 224	Tumours of the Skin and Subcutaneous Tissues	Erin Humphries 12yo Fn Staffordshire bull terrier	Skin lesion present on ventrum for 8 months, slowly progressive into 2cm ulcerated lesion with 3 other smaller lesions adjacent also noted at excision; histopathologic diagnosis of squamous cell carcinoma	Thoracic radiographs, abdominal ultrasound	Squamous cell carcinoma	Suncream; sunshirt; keep out of direct sun during hottest part of day; regular monitoring
20/08/08 225	Tumours of the Skeletal System	Kane Francis 5yo Mn Kelpie cross	One month history of progressive lameness of left foreleg, non-responsive to NSAIDs; radiographs show lytic distal radial lesion	CBC, biochemistry, U/A; FNA left prescapular node; FNA bone lesion	Reactive lesion probably in response to trauma or previous inflammation	Referred for limb amputation; non neoplastic lesion found so no adjuvant therapy required
21/08/08 226	Cancer of the Oral Cavity	Piper Richards 9yo Mn Corgi	Flat lesion noted on underside of tongue during routine dental prophylaxis; incisional biopsy = squamous cell carcinoma	CBC, Biochemistry; CT scan head and thorax	Squamous Cell Carcinoma	Owner declined surgery, cryotherapy or intralesional chemotherapy
22/08/08 227	Tumours of the Skeletal System	Beau Mann 12yo Mn Labrador	3 weeks history of progressive hind limb weakness; one week history of lack of voluntary urination and defecation; bone lesion in dorsal body of L6, and 2 discrete masses of cranial left lung seen on radiographs	None	Open	Palliation with carprofen, tramadol and amantadine. Owner euthanased 3 days later
25/08/08 228	Lymphosarcoma	Zara Cridland 4yo Fn Golden retriever	3 week history of Generalized lymphadenopathy; FNA of node suggestive of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	Owner declined further diagnostics and treatment

25/08/08 229	Mast Cell Tumours	Nikita Andrew 5yo Fn Staffordshire bull terrier	Grade 2 (low grade) mast cell tumour completely excised from left lateral thigh	Abdominal ultrasound	MCT Grade 2 (low grade); T2N0M0; Stage Ia	No further treatment required
26/08/08 230	Mast Cell Tumours	Jazz Field 7yo Mn Staffordshire bull terrier	3 month history of mass over caudal left thigh, slowing growing then became ulcerated; biopsy diagnosis of mast cell tumour, grade 3, complete excision	CBC, Biochemistry, U/A; Abdominal ultrasound; FNA regional node; bone marrow aspirate	MCT grade 3; T2N0M0; Stage Ia	Vinblastine/Lomustine protocol; prednisolone. Completed 4 out of 10 treatments then owner declined further treatment due to financial reasons
27/08/08 231	Soft Tissue Sarcoma	Cindy Properjohn 12yo F Kelpie cross	Mass excised from right medial antebrachium; histopathologic diagnosis of haemangiopericytoma.	CBC, Biochemistry, U/A; FNA right prescapular node; thoracic radiographs x 3	Haemangiopericytoma, Grade 2; T1aN0M0, Stage I	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
27/08/08 232	Tumours of the Skeletal System	Boomer Jebb 5yo Fn Staffordshire bull terrier cross	6 week history of limping on right foreleg. Radiographs demonstrate lytic lesion of proximal humerus with periosteal proliferation	Jamshidi bone biopsy; thoracic radiographs; lateral radiograph of right humerus; FNA right prescapular lymph node; CBC, biochemistry, U/A	Only reactive bone seen on biopsy	Referred for limb amputation after repeat radiographs one month later showed disease progression within the humerus but owner declined further treatment. Lost to follow up.
29/08/08 233	Tumours of the Skin and Subcutaneous Tissue	Spike Whitesmith 8yo Mn JRT	First actinic squamous cell carcinoma removed from ventrum 18 months prior; 2 surgeries since	None	Cutaneous squamous cell carcinoma	Suncream, keep out of direct sun where possible; piroxicam. Reassessed 3 months later: skin less erythematous but several small ulcerations on ventrum so treated with cryotherapy. Died August 2011.
01/09/08 234	Tumours of the Male Reproductive System	Toby Green 10yo Mn Border Collie	4 week history of stranguria, then faecal tenesmus; abdominal ultrasound demonstrated enlarged, mineralized prostate with regional lymphadenopathy; FNA prostate and prostatic wash showed mild inflammation; 7 days enrofloxacin prior to presentation	None	Open: neoplasia vs. prostatitis	Owner declined further diagnostics and treatment; palliation with piroxicam and codeine
01/09/08 235	Mast Cell Tumours	Sadoko Agnew 12yo Fn Sheltie	3 months ago developed several lumps on ventrum: 5 masses excisional biopsy: 4 = steatitis, 1 = grade II (low grade) mast cell tumour with incomplete excision	CBC; Abdominal ultrasound	MCT grade 2 (low grade); T1NxM0; Stage Ia	Vinblastine x 8; prednisolone. No recurrence at time of death June 2011
02/09/08 236	Cancer of the Nasal Planum	Milo Gartrell 9yo Mn DSH	3 month history of small crusts on nasal planum	Biopsy of lesions	Carcinoma in-situ	Cryosurgery
02/09/08 237	Soft Tissue Sarcomas	Max Antonio 11yo Mn DSH cat	One month history of swelling on distal antebrachium; excisional biopsy = intermediate grade fibrosarcoma	None	Fibrosarcoma, Grade 2; T1aNxMx, Stage I or higher	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Tumour recurrence at proximal and distal ends of previous surgery wound
03/09/08 238	Mast Cell Tumours	Delta Hawes 4yo Fn Labrador	Superficial excoriation present for years, last 6 months became a mass which then became ulcerated; another 2 masses found at surgery in right and left caudal mammary tissue; excision of all 3 masses: grade III mast cell tumour with inguinal node metastasis	CBC, biochemistry; abdominal ultrasound	Mast Cell Tumour, grade III; T0N2bM0; Stage IIb	Vinblastine /Lomustine /prednisolone protocol
04/09/08 239	Mast Cell Tumours	Chloe Rothwell 13yo Fn Maltese cross	Mass on ventrum present for 6 months with rapid growth in last 3 weeks; marginal excision grade II mast cell tumour	CBC, Biochemistry; Abdominal ultrasound; FNA spleen; bone marrow aspirate	Mast Cell Tumour, grade II; T0N0M0; Stage Ia	Vinblastine x 8; prednisolone
04/09/08 240	Lymphosarcoma	Maxine Millar 11yo Fn Pug	Weight loss over the last month despite good appetite; diarrhoea for 2 weeks; polyuria, hyposthenuria and UTI; solitary jejunal mass diagnosed on abdominal ultrasound; excisional biopsy = lymphosarcoma	CBC, Biochemistry, U/A; urine M/C/S; bone marrow aspirate	Lymphosarcoma	Surgical excision of primary tumour. Developed complications post operatively and was euthanased

05/09/08 241	Tumours of the Skeletal System	Cajun D'Mello 9yo M Rottweiler	One week history of marked lameness right foreleg; radiographs showed very subtle lysis and periosteal reaction of proximal humerus	None	Open	Palliation – carprofen and codeine
10/09/08 242	Leukaemias and Myeloproliferative Disorders	Kina Bellerby 11yo Fn Staffordshire bull terrier	Repeatable lymphocytosis, first noted on blood test prior to anaesthetic; mild bilateral popliteal node enlargement	CBC, Biochemistry; bone marrow aspirate; abdominal ultrasound; FNA spleen; popliteal node excision for histopathology and immunohistochemistry	Chronic Lymphoid Leukaemia	Monitor with monthly CBC
10/09/08 243	Lymphosarcoma	Jaks Coghlan 9yo Mn Staffordshire terrier cross	One week history of Generalized lymphadenopathy; FNA suggestive of lymphoma	None	Lymphosarcoma	Owner declined further diagnostics and treatment
11/09/08 244	Soft Tissue Sarcomas	Dolly Piper 9yo Fn Bichon Friese	Mass on chest first developed 3 years ago; resected 3 times since then; most recent excision was 5 months ago; histopathology suggests haemangiopericytoma, intermediate to high grade, incomplete excision	CT scan primary mass and full thorax	Haemangiopericytoma, Grade 2-3; T2bN0M0, Stage III	Referred for marginal surgical excision followed by adjuvant radiation therapy
11/09/08 245	Cancer of the Oral Cavity	Ringo Plummer 14yo Fn DSH	Swelling of right upper lip noted by referring vet at routine examination; incisional biopsy diagnosed fibrosarcoma	Urea, Creatinine, U/A; Blood pressure; CT scan head and thorax	Fibrosarcoma	Electrochemotherapy. Assessment one month after procedure indicated disease progression; started metronomic chemotherapy: 10mg/m2 cyclophosphamide sid, 0.2mg/kg piroxicam eod for life; no response to treatment; palliated then euthanased February 2009
15/09/08 246	Mesothelioma	Abbey Lennon 12yo Fn golden retriever	Presented after pericardectomy for pericardial effusion; histopathologic diagnosis of mesothelioma	CBC	Pericardial mesothelioma	Intrathoracic carboplatin every 3 weeks x 6; piroxicam 0.3mg/kg daily. Recurrent pleural effusion; euthanased 20/10/08
16/09/08 247	Lymphosarcoma	Chad Anderson 9yo Mn Corgi	3 month history of progressive skin lesions, non responsive to antibiotics or prednisolone; histopathologic diagnosis of epitheliotropic lymphoma	None	Epitheliotropic lymphoma	Isotretinoin 2mg/kg daily; omega 3 fish oil. Deterioration of condition before retinoids could take effect; started on interferon. Continued disease progression and euthanased December 2008
17/09/08 248	Mast Cell Tumours	Buddy Bannister 7yo Mn mastiff cross	Mass over right rump present over a year; excisional biopsy diagnosis of grade 1 mast cell tumour, complete excision; mass over left hock present 3 months without rapid growth, excisional biopsy diagnosis of grade 2 (low grade) mast cell tumour, incomplete excision	None	MCT: one grade 1, one grade 2 (low grade); T0NxMx; Stage IIIa	Owner declined further diagnostics and treatment
19/09/08 249	Lymphosarcoma	Pearl Vivian 11yo Fn flat coated retriever	3 week history of progressive lethargy and inappetance; Generalized lymphadenopathy noted one week ago; FNA suggestive of lymphoma	None	Lymphosarcoma; stage IVb or higher	Palliation: prednisolone 2mg/kg tapering
19/09/08 250	Hepatic Tumours	Ben Ryan 12yo Mn golden retriever cross	3 week history of progressive lethargy and inappetance; bloods unremarkable; abdominal ultrasound detected 8cm diameter vascular mass within abdomen	CT scan thorax and abdomen	Hepatocellular adenocarcinoma	Complete resection. No further treatment required.
22/09/08 251	Cancer of the Oral Cavity	Jock Lee 9yo Mn Staffordshire bull terrier	Swelling of gum over upper right canine tooth for a couple of months; punch biopsy suspected osteosarcoma but the possibility of an odontogenic tumour with bone production could not be excluded	CT scan oral cavity and thorax	Low grade undifferentiated osteogenic sarcoma	Radiographically benign, chronic bony lesion of right upper maxilla adjacent to the canine tooth seen on CT; not typical of an osteosarcoma; dog referred for marginal excision including entire canine tooth



22/09/08	Tumours of the Mammary Gland	Chicky Lisson 10yo Fn Cocker spaniel	3 month history of 2cm mass middle left mammary gland; excised by referring vet and diagnosed as mammary adenocarcinoma	None	Mammary papillary intraductular adenocarcinoma, low MR, no distinct vascular involvement, tumour cells can be seen in the surrounding tissues but complete excision of primary.	Owner declined further diagnostics and treatment
252						
24/09/08	Nasal Tumours	Maxwell Kennedy 8yo Mn Maltese cross	5 week history of increased upper respiratory noise and blood tinged nasal discharge; CT scan demonstrated large mass obliterating right nasal cavity; biopsy diagnosed carcinoma	CBC	Poorly differentiated carcinoma	Carboplatin and Gemcitabine, alternating with doxorubicin every 3 weeks x 6; piroxicam 0.3mg/kg daily. Repeat CT scan after 2 cycles of treatment indicating disease progression; valproic acid added to protocol; pamidronate given as analgesic; showed improvement after third doxorubicin / valproic acid treatment, therefore dropped carboplatin from protocol; developed seizures and was euthanased 20/1/09
253						
25/09/08	Lymphosarcoma	Harley Healy 6yo Mn Rottweiler	Generalized lymphadenopathy; FNA suggestive of lymphoma	CBC, biochemistry, U/A; bone marrow aspirate	Lymphoma; Stage IIIa	HDC-BMT
254						
30/09/08	Cancer of the Nasal Planum	Manja Tan 8yo Fn DMH cat	'Scratch' on the nasal planum for a few months but only rapid growth in the last month; incisional biopsy diagnosis of squamous cell carcinoma	Urea, Creatinine	Squamous Cell Carcinoma	Electrochemotherapy. No reduction in tumour size. Treated with aggressive cryotherapy; marked sloughing of nasal planum and surrounding 1.5cm of skin
255						
01/10/08	Tumours of the Endocrine System	Max Healy 12yo Mn golden retriever	Mass measuring 5.5cm3 ventral neck first noted by referring vet when taking jugular blood sample; FNA suggestive of cells of 'neuro-endocrine' origin	T4/TSH; CT scan neck and thorax	Thyroid adenocarcinoma	Referred for surgical excision of mass; followed by adjuvant doxorubicin every 3 weeks x 6. Repeat thoracic radiographs 26/2/09 showed no evidence of metastatic disease
256						
02/10/08	Lymphosarcoma	Scylla Walsh 10yo Fn German shepherd	6 days history of lethargy, inappetance, pyrexia, lymphadenopathy, hepatosplenomegaly; FNA of nodes suggestive of lymphoma	No further diagnostics performed	Lymphoma, Stage IVb or higher	None. Owner elected euthanasia due to hepatic failure
257						
02/10/08	Tumours of the Skin and Subcutaneous Tissues	Duke Asic 10yo Mn blue heeler	Several month history of mass on medial left elbow with recent rapid increase in size now causing lameness of the left foreleg. FNA of mass suggestive of soft tissue sarcoma; FNA of enlarged left prescapular (regional) node showed severe eosinophilic lymphadenitis with reactive lymphoid hyperplasia	None	Open – soft tissue sarcoma vs. mast cell tumour vs. fungal granuloma	Owner declined further diagnostics and treatment
258						
03/10/08	Tumours of the Skeletal System	Sandy Gyurka 6yo Fn Labrador	2 month history of left foreleg lameness, with no improvement after anti-inflammatory therapy; radiographs of proximal left humerus showed mild periosteal reaction cranial mid humerus and DJD changes to shoulder joint	Repeat radiographs 3 weeks later showed stable disease	Degenerative joint disease left shoulder joint	Referred to orthopedic surgeon for management
259						
03/10/08	Mast Cell Tumours	Biscuit Phillips 11yo Fn Pug	Mass present on right foreleg for a year with very slow growth; FNA suggested mast cell tumour; wide excisional biopsy diagnosis of mast cell tumour, grade 2 (low grade) incomplete excision	CBC, biochemistry, urinalysis; FNA mass ventral chest; FNA right prescapular node abdominal ultrasound; bone marrow aspirate	MCT, Grade 2 (low grade); T1N0M0; Stage Ia	Adjuvant Vinblastine x 8/ prednisolone
260						

07/10/08 261	Hepatic Tumours	Abbey Webb 11yo Fn Dalmatian	Abdominal swelling and diarrhoea 7 days prior to presentation; abdominal ultrasound detected solitary hepatic mass	CT thorax and abdomen; ultrasound-guided FNA hepatic mass	Massive hepatic or bile duct carcinoma with regional lymphadenopathy	Palliation: codeine 1mg/kg daily, Hills l/d. Enjoyed good quality of life for 2 months then became uncomfortable, lethargic and inappetent; owner elected euthanasia
07/10/08 262	Mast Cell Tumours	Millie Dawes 10yo Fn Maltese cross	Mass over right shoulder for a year with recent slow growth; histopathologic diagnosis of mast cell tumour, grade 2 (low grade), incomplete excision	None	MCT, Grade 2 (low grade); T0NxMx; Stage Ia	Owner declined further diagnostics and treatment
08/10/08 263	Lymphosarcoma	Tippy Freeman 12yo Fn Corgi	Generalized lymphadenopathy; FNA suggestive of lymphoma	CBC, Biochemistry	Lymphoma; Stage IVa (or higher)	Doxorubicin every 3 weeks x 6. Initial response to treatment; required 10% dose reduction due to nausea and vomiting; disease recurrence by treatment 5/6; euthanased 1/3/09
09/10/08 264	Lymphosarcoma	Kane Berinson 6yo M German shepherd	Generalized lymphadenopathy; FNA suggestive of lymphoma	CBC, Biochemistry, U/A; node biopsy for histopathology and immunohistochemistry; bone marrow aspirate	Lymphoma, Centroblastic B cell; Stage IIIa	UW-19
09/10/08 265	Tumours of the Skeletal System	Ted E Bear Kingsbury 9yo M golden retriever	Firm swelling around right hock noted a few days prior to presentation; no lameness; no injury known	Thoracic radiographs; hock radiographs	Degenerative disease	Monitoring only
10/10/08 266	Mast Cell Tumours	Bella Svenningsson 7yo Fn Labrador	Had a high grade mast cell tumour incompletely removed from left inguinum 12 months prior; treated with adjuvant Vinblastine/LOMUSTINE/prednisolone chemotherapy; now mass present again in left inguinum	FNA mass; abdominal ultrasound; bone marrow aspirate; CBC	MCT, Grade 3; rTxN1M1; Stage IVa	Palliation: prednisolone 2mg/kg daily, tapering; omega 3 fatty acids; chlorpheniramine and anti-ulcer medication if indicated
16/10/08 267	Hepatic Tumours	Kitza Greble 12yo Fn Staffordshire bull terrier cross	Had a solitary hepatic mass removed 6 weeks prior to presentation after it ruptured; histopathologic diagnosis of hepatic adenoma or low grade adenocarcinoma	CT scan thorax and abdomen to assess if recurrent or progressive disease present	Hepatic adenoma	Monitoring only
17/10/08 268	Mast Cell Tumours	Gemma O'Brien 13yo Fn Sheltie	One month history of sneezing and open mouth breathing; incisional biopsy diagnosis of high grade mast cell tumour	CBC	MCT, Grade 3; T1NxMx; Stage	Vinblastine, Lomustine q3wks x 5 cycles; prednisolone. Excellent initial clinical improvement; developed sneezing and nasal discharge again at last treatment; within 2 weeks developed seizures and was euthanased 24/2/09
17/10/08 269	Tumours of the Skin and Subcutaneous Tissues	Karri Clark 9yo Fn Staffordshire bull terrier	3 month history of mass on outer lower left lip; histopathologic diagnosis of malignant melanoma, MI 3/10hpf, nuclear atypia 3/10hpf; complete but close excision	FNA left submandibular lymph node	Malignant Melanoma	Monitoring only
20/10/08 270	Soft Tissue Sarcomas	Rocky Leotta 12yo M Bull Arab	Recurrent soft tissue sarcoma on left stifle first removed 2006; now measures 10x10cm; newer mass medial right thigh	None	Soft tissue sarcoma, Grade 1; rT2bNxMx, Stage III or higher	Owner declined further diagnostics and treatment
20/10/08 271	Cancer of the Oral Cavity	Harley Wovodich 11yo Mn Labrador	One month history of mass on left side of face but involving caudal hard palate; weight loss despite eating well; histopathologic diagnosis of low grade spindle cell tumour	None	Low grade spindle cell tumour – suspect “histologically low grade, behaviourally high grade” sarcoma, or amelanotic melanoma	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life

21/10/08	Ocular Tumours	Sophie Scrimgeour 10yo Fn Burmese cat	2 month history of mass on dorsomedial iris; FNA suggestive of lymphoma; no other abnormalities on physical examination; FeLV and FIV negative	CBC, U/A; abdominal ultrasound	Ocular lymphoma	UW-25. Only one treatment given as Sophie experienced grade 3 gastrointestinal toxicity; she then developed marked increase in intraocular pressure and had an enucleation. The owner declined further chemotherapy
272						
21/10/08	Soft Tissue Sarcoma	Ruggie Mihaly 13yo Fn DSH cat	One month history of rapid growth of mass over left metatarsals; histopathologic diagnosis of high grade fibrosarcoma; left popliteal node mildly enlarged	CBC, Biochemistry, U/A; FNA left popliteal node	Fibrosarcoma, Grade 3; T1bN0Mx, Stage II	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Stable disease until February 2009; owner declined repeat staging and limb amputation; euthanased 22/2/09
273						
22/10/08	Soft Tissue Sarcoma	Desmo Storey 10yo Mn Labrador	One month history of firm but mobile mass on right thorax; FNA suggestive of soft tissue sarcoma; smaller mass in right axilla not tested	FNA mass in right axilla; CBC, U/A; CT scan thorax; abdominal ultrasound; punch biopsy mass	Haemangiopericytoma, intermediate grade, complete excision	Referred for wide excision of mass; no adjuvant treatment required
274						
23/10/08	Lymphosarcoma	Ziggy Buckley 9yo Mn Boxer	2 week history of inappetance, diarrhoea and weight loss; abdominal ultrasound showed multiple nodules along GIT and mesenteric lymphadenopathy; intestinal biopsy diagnosed diffuse, high grade, large cell lymphoma	CBC	Diffuse, high grade, large cell lymphoma	UW-19; admitted to ICU for intravenous fluid therapy for 24 hours. No improvement in condition after 6 days; owner elected euthanasia
275						
24/10/08	Lymphosarcoma	Rex Pasco 8yo Mn Jack Russell terrier cross	One month history of lethargy and inappetance; then owner noticed enlarged superficial nodes; FNA suggestive of lymphoma; incisional biopsy showed no distinct lymph node tissue, only necrotising cellulitis with encapsulation.	CBC, abdominal ultrasound, bone marrow aspirate	Presumptive diagnosis of lymphoma; Stage IVb	HDC-BMT. Recurrence of disease. Treated with UW-19
276						
27/10/08	Mast Cell Tumours	Zan Austin 12yo Fn Kelpie cross	One month history of stertor and snoring; CT scan showed large mass occluding the nasopharynx and extending into the left nasal cavity; incisional biopsy diagnosed MCT, high grade	CBC, Biochemistry, U/A	MCT, Grade 3; T1NxMx; Stage 3a	Imatinib mesylate 4.4mg/kg daily for 14 days. Euthanased 12/11/08 due to development of neurological signs
277						
28/10/08	Mast Cell Tumours	Axle Riley 8yo M Staffordshire Bull Terrier	12 months prior had 3 low/intermediate grade mast cell tumours completely removed from right thorax; developed a mass between toes 3 and 4 on left fore foot 3 weeks ago; FNA suggested MCT; excisional biopsy diagnosed MCT grade 2 (low grade), incomplete excision	CBC, Biochemistry, U/A; FNA left prescapular node; abdominal ultrasound	MCT Grade 2 (low grade); T1N0M0; Stage Ia	Vinblastine x 8; prednisolone
278						
29/10/08	Lymphosarcoma	Max Haynes 7yo Mn Rottweiler	2 week history of Generalized lymphadenopathy; FNA diagnosed lymphoma	CBC, Biochemistry, U/A	Lymphosarcoma, Stage IIIa or higher	Doxorubicin q3wks x 6. Entered remission after one cycle; became acutely lame on right hindleg and radiographs revealed an aggressive monostotic bone lesion of the proximal tibia, presumed osteosarcoma; administered doxorubicin and pamidronate; euthanased 2 weeks later
279						
30/10/08	Mast Cell Tumours	Hannah Carle 6yo F Boxer	6 week history of mass under neck, waxing and waning; excisional biopsy diagnosed MCT	FNA right and left submandibular lymph nodes	MCT, Grade 2; TN1Mx	Owner declined further diagnostics and treatment
280						
31/10/08	Tumours of the Skin and Subcutaneous Tissues	Molly Davey 6yo Fn Maltese cross	Mass over left cheek for a couple of years unchanged, then mass over left shoulder noticed by groomer. Excisional biopsy of both masses suggested baso-squamous carcinoma, with nodal involvement	CBC, Biochemistry, U/A; CT scan head and thorax	Baso-squamous carcinoma	Gemcitabine and carboplatin protocol, every 3 weeks x 6. Developed delayed neutropenia therefore interval between treatments extended to 4 weeks
281						

31/10/08	Lymphosarcoma	Leo Hurley 10yo M golden retriever	2 inguinal masses detected by groomer a week ago; FNA suggestive of lymphoma. Dog also had undescended testes and never castrated.	Abdominal ultrasound	Lymphosarcoma	Referred back to original vet for excisional biopsy of both masses. Owner declined histopathology but surgeon said they visually looked like testicles
282						
03/11/08	Mast Cell Tumours	Jessie Payne 10yo Fn Papillion	Mass over right shoulder noticed by owner 3 weeks prior; excisional biopsy diagnosed mast cell tumour, grade 2 (low grade), marginal excision	CBC, biochemistry; FNA left prescapular lymph node	MCT, grade 2 (low grade); T1N0M0, Stage Ia	Vinblastine x 8; prednisolone
283						
04/11/08	Urinary Bladder Cancer	Jazz Nind 12yo Fn Jack Russell terrier	2 month history of lower urinary tract signs, then PU/PD in the last month; abdominal ultrasound showed bladder mass, enlarged MILNs and hydronephrosis	None	Bladder mass – suspected metastatic and obstructive TCC	Piroxicam 0.3mg/kg daily. Good response to piroxicam sole therapy at 6 week revisit
284						
05/11/08	Lymphosarcoma	Phoebe Simenson 11yo Fn Border Collie	3 week history of enlarged lymph nodes and ‘rash’ on belly; fine needle aspirate cytology diagnosis of lymphoma; appeared to have bruising on caudal ventrum	None	Lymphosarcoma; Stage IVa or higher	Palliation: prednisolone 2mg/kg tapering
285						
07/11/08	Lymphosarcoma	Kira Flynn 11yo Fn German shepherd	Two small masses on neck and one on right shoulder developed 3 weeks prior. FNA suggestive of lymphoid neoplasia. Excisional biopsy of masses confirmed diffuse intermediate to high grade immunoblastic lymphoma	IHC (CD3, CD79a), thoracic radiographs, abdominal ultrasound, bone marrow aspirate and concurrent CBC	Lymphosarcoma, B cell; <b>Stage IVa</b>	UW-19. No reduction in spleen size after 6 treatments so switched to Lomustine every 3 weeks; still no clinical improvement. Owner declined splenectomy and lomustine was continued every 4-6 weeks with a palliative intent
286						
07/11/08	Histiocytic sarcoma	Grace Jones 9yo Fn Flat Coated Retriever	3 month history of progressive lameness of right foreleg with recent soft tissue swelling of area; incisional biopsy diagnosis of undifferentiated sarcoma; elbow radiographs showed lysis of lateral humeral condyle	Thoracic radiographs, abdominal ultrasound; CBC, Biochemistry	Undifferentiated sarcoma of the bone	Lomustine every 3 weeks x 6; pamidronate 1.3mg/kg every 3 weeks; carprofen; codeine. Developed draining fistulae from both elbows within 3 days of treatment and was euthanased
287						
10/11/08	Lymphosarcoma	Fifi Laforet 8yo Fn Jack Russell terrier cross	2 week history of increased size of lymph nodes; FNA suggestive of lymphoma; CP2 within normal range	None	Lymphoma, Stage IIIa or higher	HDC-BMT. Recurrence after 6 months. Treated with UW-19.
288						
11/11/08	Lymphosarcoma	Chloe Aungier 12yo Fn German Shepherd	5 month history of progressive inappetance, weight loss, weakness then dyspnoea and cardiac dysrhythmia; abdominal radiographs showed small intestines pushed dorsally, with suspicion of cranial abdominal mass; mild anaemia and marked lymphocytosis on recent bloods	Abdominal ultrasound; FNA of diffusely enlarged spleen	Lymphoma	None. Owner declined further diagnostics and treatment; euthanased 13/11/08
289						
11/11/08	Tumours of the Skeletal System	Misty Russo 8yo Fn Labrador	Large mass on right thorax noted by referring veterinarian at routine vaccination. Owner did report that the dog had been slowing down for the last month and reluctant to go for walks. Biopsy of mass diagnosed an osteogenic sarcoma.	None	Osteosarcoma; TMx	Palliation: carprofen 2mg/kg sid; codeine 1mg/kg bid
290						
13/11/08	Cancer of the Nasal Planum	Wallace Tolkein 12yo Mn DLH	12 month history of wound on nose that has become progressively more ulcerated; sneezing and occasional bleeding has commenced in the last 2 weeks	None	Squamous cell carcinoma; T1NxMx	None
291						
14/11/08	Lymphosarcoma	Obi Cole 3yo Mn Ridgeback cross	Generalized lymphadenopathy for 2 weeks; FNA suggestive of lymphoma	CBC, biochemistry; Abdominal ultrasound; bone marrow aspirate	High Grade B-cell Centroblastic polymorphic lymphoma; Stage IIIa	UW-19. Recurrence 12 months after diagnosis. Restarted UW-19 with initial response but recurrence during second protocol.
292						

14/11/08 293	Soft Tissue Sarcoma	Pippa Hutchinson 6yo Fn Labrador	Mass on caudal left thigh for 4 weeks; excisional biopsy diagnosed high grade soft tissue sarcoma, incomplete excision	CBC, biochemistry; thoracic radiographs x 3; abdominal ultrasound	Soft tissue sarcoma, grade 3;	VAC protocol; followed by metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Grade 4 gastrointestinal toxicity after second Doxorubicin treatment
17/11/08 294	Lymphosarcoma	Kira Mannino 8yo Fn Staffordshire bull terrier	6 month history of enlarged submandibular nodes, recently enlarging; FNA suggestive of lymphoma	None	Lymphosarcoma, Stage IIIa or higher	Owner declined further diagnostics and treatment
21/11/08 295	Haemangiosarcoma	Denim Tassone 12yo Mn blue heeler cross	3 weeks ago presented to referring vet collapsed; diagnosed with splenic mass; splenectomy performed, giving histopathologic diagnosis of haemangiosarcoma; hepatic nodules seen on abdominal ultrasound but not biopsied	CBC, biochemistry; thoracic radiographs x 3; abdominal ultrasound	Splenic haemangiosarcoma; T2N0Mx, Stage II or higher	Monitoring. Recurrence of haemabdomen 12/12/08 and owner elected euthanasia
24/11/08 296	Lymphosarcoma	Cosmo Ward 13yo Mn Jack Russell terrier	6 week history of increased sneezing and snoring which then developed into a serosanguinous discharge from the right nostril; rhinoscopic guided biopsies diagnosed lymphoma	None	Intranasal lymphoma	Palliation: prednisolone 2mg/kg daily for 7 days then tapering
28/11/08 297	Soft Tissue Sarcomas	Elsa Winter 9yo Fn Bichon Frieze	3 month history of mass between toes 3 and 4 of right fore foot. No response to antibiotics. Excisional biopsy diagnosed soft tissue sarcoma, intermediate-high grade, incomplete excision	CBC, Biochemistry, U/A; thoracic radiographs x 3	Soft Tissue Sarcoma, Grade 2-3;	Doxorubicin q3weeks x 6; followed by metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
28/11/08 298	Haemangiosarcoma	Bear Brown 8yo Mn Great Pyrenees	One week prior became inappetant and lethargic. Diagnosed with pericardial and pleural effusion. Ultrasound showed heart based mass and many splenic nodules	None	Open: presumed metastatic haemangiosarcoma; T2NxM1, stage III	None
03/12/08 299	Soft Tissue Sarcomas	Sammy Abreu 8yo Fn Samoyed	12 month history of mass slowly increasing in size over right thorax; excisional biopsy diagnosed soft tissue sarcoma, grade 2, incomplete excision	CBC, Biochemistry, U/A; thoracic radiographs x 3	Soft Tissue Sarcoma, Grade 2;	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
04/12/08 300	Perianal Tumours	Zep Willis 9yo Mn Kelpie cross	2 month history of inappetance and lethargy then marked weight loss. Abdominal ultrasound showed multiple hepatic and splenic masses; 1cm mass near right anal sac detected on examination	Thoracic radiographs x 3; Abdominal ultrasound; FNA liver and spleen; incisional biopsy right anal mass	Perianal carcinoma;	Owner elected naturopathic treatment. Persistent blood ooze from biopsy site; coagulopathy diagnosed; blood transfusion administered pending results
05/12/08 301	Cancer of the Oral Cavity	Choo Choo Panetta 18yo Fn DLH	2 week history of oral mass; excisional biopsy diagnosed oral malignant melanoma. Concurrent hyperthyroidism.	CT scan head and thorax	Oral Malignant melanoma	Electrochemotherapy
08/12/08 302	Lymphosarcoma	Sweep Green 6yo Mn Field spaniel	One month history of generalized lymphadenopathy; FNA diagnosis of lymphoma	CBC, Biochemistry, U/A; node biopsy for HP and IHC; bone marrow aspirate	Lymphosarcoma;	UW-19. Recurrence prior to finishing protocol. Owner declined rescue chemotherapy.
09/12/08 303	Cancer of the Oral Cavity	Samson Vicario 7yo M Bull terrier	Mass seen by referring vet 2 months prior, measuring 3cm diameter; owner declined biopsy; mass now doubled in size; incisional biopsy diagnosis of fibrosarcoma	None	Fibrosarcoma	None
09/12/08 304	Lymphosarcoma	Amba-Rose Hood 6yo Fn German shepherd cross	Inguinal masses and bruising noted by owner after dog groomed 2 weeks ago. Referring vet noted generalized lymphadenopathy; FNA diagnosed lymphoma	None	Lymphosarcoma	Palliation: 2mg/kg prednisolone daily, tapered over 3 weeks
10/12/08 305	Lymphosarcoma	Bronson Scrivens 11yo Mn Weimeraner	Inappetance which owner thought was dental disease; referring vet noted lymphadenopathy; FNA diagnostic of lymphoma	None	Lymphosarcoma	Palliation: 2mg/kg prednisolone daily, tapered over 3 weeks

11/12/08 306	Tumours of the Mammary Gland	Sandie Solly 12yo Fn Maltese cross	Rapidly growing mass over left mammary gland 2; excisional biopsy diagnosed mammary carcinoma, incomplete excision	Thoracic radiographs x3; FNA regional LN (left axillary); CBC, Biochemistry, U/A	Mammary ductular adenocarcinoma (high grade), incomplete excision, MR >6/hpf, cells evident in lymphatics.	Monitoring only
11/12/08 307	Lymphosarcoma	Heidi Cahill 7yo Fn Australian Cattle dog	Acute onset, 4 week history of vomiting. Endoscopic guided gastric biopsies diagnosed T cell lymphoma	CBC, Biochemistry	Lymphosarcoma	UW-19, including L'asparaginase at first treatment. Clinical disease progression; developed generalized lymphadenopathy after 3 treatments; owner elected euthanasia 5/1/09
12/12/08 308	Lymphosarcoma	Amy Pitt 6yo Fn Standard Poodle	Developed diarrhea which resolved after a few days but was then inappetant and lethargic; Generalized lymphadenopathy noted; node biopsy diagnosed lymphoma	CBC, Biochemistry; IHC on biopsy sample; Bone marrow aspirate	Diffuse intermediate grade immunoblastic lymphoma; Stage IIb	UW-19
16/12/08 309	Mast Cell Tumours	Chester Downes 11yo Mn Greyhound cross	Mass present on right lateral thigh for 2-3 years with recent growth; excisional biopsy diagnosis of grade 2 mast cell tumour, incomplete excision	None	MCT, Grade 2;	Owner declined further diagnostics and treatment
22/12/08 310	Urinary Bladder Cancer	Max Fardon 8yo Mn Blue heeler	One month history of pollakiuria; haematuria started one week ago; abdominal ultrasound demonstrated mass in trigone of bladder, irregular medial iliac nodes and hepatic nodules	None	Open – suspected transitional cell carcinoma	Owner declined further diagnostics and treatment
23/12/08 311	Soft Tissue Sarcomas	Dacey Jeffress 13yo Fn Wolfhound cross	Two week history of mass over right elbow; excisional biopsy diagnosis of intermediate grade soft tissue sarcoma	CBC, Biochemistry, U/A; UPCR; thoracic radiographs x 3	Soft tissue sarcoma, grade 2	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
23/12/08 312	Soft Tissue Sarcomas	George Wyman 14yo Mn crossbreed	6 month history of mass adjacent right tail base with rapid growth in the last 2 months. Abdominal mass also palpable on physical examination	Abdominal ultrasound; CT scan thorax and abdomen; CBC, biochemistry; FNA intra-abdominal mass; incisional biopsy mass adjacent tail base	Mass near tail base = fibrosarcoma, Grade 3; abdominal mass = open	Owner declined exploratory laparotomy and chemotherapy
24/12/08 313	Mast Cell Tumours	Grover Norris 13yo Fn cross breed	3 week history of licking side then developing a sore. FNA suggestive of mast cell tumour, therefore wide excision and histopathology performed = mast cell tumour, high grade, complete excision	None	MCT, Grade 3;	Owner declined further diagnostics and treatment
05/01/09 314	Cancer of the Oral Cavity	Angus Connolly 8yo Mn Rottweiler	3 week history of increased licking then oral mass noted in right angle of jaw. Incisional biopsy diagnosis of oral malignant melanoma, MI 20/10, nuclear atypia 5/10	None	Malignant Melanoma	Owner declined further diagnostics and treatment
8/1/09 315	Mast Cell Tumours	Rex Wallington 9yo Mn Bichon Frise	10 weeks prior developed mass over right tibia; excisional biopsy diagnosed mast cell tumour, grade 2, incomplete excision. Recurrence of mass started in the last 10 days	None	MCT, grade 2	Owner declined further diagnostics and treatment
9/1/09 316	Mast Cell Tumours	Zoe Sobkowiak 4yo Fn Labrador	2 weeks ago owner noticed mass over right antebrachium; saw referring vet 2 days later for excisional biopsy – mast cell tumour, grade 2 (low grade), incomplete excision	CBC; FNA right prescapular node	MCT, Grade 2 (low grade);	Vinblastine x 8, prednisolone
9/1/09 317	Lymphosarcoma	Bella Mansell 1yo Fn Bombay cat	One week history of lethargy and dyspnoea; cranial mediastinal mass detected on thoracic radiographs and ultrasound; FNA diagnosis of lymphoma	CBC, Biochemistry	Lymphosarcoma	UW-25. Experienced anorexia and nausea during the first cycle so 10% dose reductions applied; rapid clinical response however; repeat thoracic radiographs after first cycle confirmed complete remission

9/1/09	Lymphosarcoma	Oscar Ellis 6yo M Maltese terrier	One week history of enlarged submandibular lymph nodes (other nodes normal); FNA suggestive of lymphoma; marked periodontal disease seen on physical examination	CBC, Biochemistry, U/A; node biopsy for histopathology and IHC; abdominal ultrasound; bone marrow aspirate	Reactive Lymphoid Hyperplasia	Referred back to original vet for dental treatment and 3 week course of broad spectrum antibiotics
318						
12/1/09	Tumours of the Skin and Subcutaneous Tissues	Puss in Boots Hill 14yo Mn DSH cat	4 month history of waxing and waning mass under the chin; not irritating cat; excisional biopsy diagnosed sweat gland adenocarcinoma, incomplete excision	FNA right submandibular lymph node; thoracic radiographs	Sweat Gland Adenocarcinoma	Referred for CT scan head, followed by further local surgery; repeat histopathology confirmed no evidence of adenocarcinoma. Repeat surgery showed no evidence of disease so monitoring only
319						
13/1/09	Haemangiosarcoma	Caveat Culshaw 8yo Mn Boxer	3 week history of bouts of lethargy which he seemed to recover from. Abdominal mass palpated by referring vet; abdominal ultrasound detected large, cavitory mass in right dorsocaudal abdomen, with evidence of haemorrhage; FNA of mass suspected sarcoma	CBC, Biochemistry; thoracic radiographs	Haemangiosarcoma	Referred for exploratory laparotomy and mass excision; small hepatic nodules visualized at surgery and also biopsied; followed by adjuvant VAC protocol. Recurrence of disease 28/2/09; died 07/03/09
320						
14/1/09	Soft Tissue Sarcomas	Harley Brown 12yo Mn Labrador cross	Unknown duration of mass over left shoulder but did have growth over the one month since noted; FNA of mass suggestive of haemangiopericytoma	CBC, Biochemistry; FNA right prescapular node; incisional biopsy mass	Haemangiopericytoma, grade 1	Initial punch biopsies diagnosed lipoma, therefore referred back to original vet for marginal excision of mass and histopathology. Commenced metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
321						
15/1/09	Mast Cell Tumours	Mopsy Trezona 8yo Fn Maltese cross	One month history of mass over left side of face, non responsive to antibiotics or dental prophylaxis; excisional biopsy diagnosed mast cell tumour, grade 2 (high grade)	CBC, Biochemistry; FNA left submandibular node; abdominal ultrasound; FNA splenic nodule; bone marrow aspirate	MCT, grade 2 (high grade); T0N1M0	Palliation: omega-3 fish oil; chlorpheniramine, prednisolone and omeprazole as required
322						
15/1/09	Lymphosarcoma	Samwise Michalka 4yo Mn Russian Blue cat	Mass noticed by owner caudal to left ear; saw referring vet the next day who also found mass left prescapular region; FNA suggestive of lymphoma	Excisional biopsy of both masses for histopathology and IHC	Reactive Lymphoid Hyperplasia	Referred back to original vet for monitoring
323						
16/1/09	Mast Cell Tumours	Hulk Reeves 5yo M Rottweiler	3 week history of mass adjacent right tail base with frequent bleeding; incisional biopsy non-diagnostic but dog experienced bleeding from bladder and lungs post-operatively	CBC, Biochemistry; abdominal ultrasound	Open – MCT, haemangiosarcoma	Owner declined further diagnostics and treatment
324						
19/1/09	Tumours of the Skeletal System	Sophie Lemmey 7yo Fn Labrador	4 week history of lameness of right foreleg; radiographs showed aggressive monostotic lesion of the mid radius; bone biopsy diagnosed osteosarcoma	CBC, Biochemistry; thoracic radiographs; pelvic radiographs; FNA right prescapular node	Osteosarcoma; T3M0	Doxorubicin x 2, Carboplatin x 4; pamidronate. Progressive lameness with medical therapy only at treatment 3; repeat thoracic radiographs still showed no evidence of metastatic disease, so referred for limb amputation, then continued second half of protocol
325						
20/1/09	Cancer of the Oral Cavity	Zella Rothwell 7yo Fn Bernese Mountain Dog	2 week history of salivation from right side of mouth and gingival proliferation over right lower jaw	CT scan head, thorax and abdomen; biopsy of gingival mass, sublingual mass and node on left side of neck	Lymphosarcoma	Owner declined definitive treatment. Euthanased 16/2/09 due to disease progression
326						
21/1/09	Soft Tissue Sarcomas	Connie Dixon 10yo Fn cross breed	3 month history of slowly growing mass adjacent right tail base; incisional biopsy diagnosis of soft tissue sarcoma, intermediate grade	None	Soft Tissue Sarcoma, Grade 2;	Referred for marginal excision of mass. Then commenced metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
327						

22/1/09 328	Tumours of the Skin and Subcutaneous Tissues	Jewel Perry 8yo Fn Labrador cross	Rapid growth of mass over left medial upper eyelid; excisional biopsy diagnosed squamous cell carcinoma, incomplete excision; started to re-grow within 7 days of biopsy	FNA left submandibular lymph node; thoracic radiographs	Squamous Cell Carcinoma;	Referred for wide excision, necessitating enucleation of the eye. Within a week of initial consult before surgical opinion sought there was marked disease progression and owner elected euthanasia
27/1/09 329	Soft Tissue Sarcomas	Lucy Brown 9yo Fn Cocker Spaniel	3 month history of mass over right thorax slowly increasing in size. Excisional biopsy diagnosed grade 1 haemangiopericytoma, incomplete excision	CBC, Biochemistry	Haemangiopericytoma, Grade 1	Owner elected to monitor for disease recurrence
30/1/09 330	Perianal Tumours	Sam Jenna 13yo Mn Poodle	Weight loss over the last 3 months; cough for one month; perianal mass noted one week ago; FNA suggestive of apocrine gland adenocarcinoma	None	Apocrine gland adenocarcinoma	Owner declined further diagnostics and treatment
30/1/09 331	Mast Cell Tumours	Kiefer Craven 10yo Fn Staffordshire bull terrier	Mass on lateral left thigh for 6 months; mass over left flank present for 6 weeks. FNA of flank mass diagnosed MCT; FNA of thigh mass inconclusive	Referred for marginal excisional biopsy of thigh mass, and wide excision of flank mass	Flank = MCT, grade II (low grade), complete excision Thigh = fibroadnexal dysplasia	Owner declined further staging of the disease
9/2/09 332	Tumours of the Skin and Subcutaneous Tissues	Taylor Ward 7yo Fn Rottweiler	2 month history of developing mass on toe 2 right forefoot, non responsive to antibiotics; radiographs showed lysis of P3; metacarpophalangeal amputation performed; HP= paronychia squamous cell carcinoma	FNA regional node; thoracic radiographs	Paronychia squamous cell carcinoma; T4NxMx	Staging tests clear; owner declined adjuvant chemotherapy
10/2/09 333	Mast Cell Tumours	Kali Goddard 7yo Fn Boxer	Mass over caudal left thigh present for one week; excisional biopsy diagnosed high grade MCT, marginal excision. Several smaller masses have since developed over right shoulder, neck and chest	FNA 2 of the masses over neck and shoulder	MCT, grade 3; Stage IIIa or higher	Owner declined further staging of the disease
12/02/09 334	Tumours of the Intestinal Tract	Zed Paull 11yo Mn Labrador cross	Three week history of vomiting and diarrhoea, marked weight loss and progressive inappetance and lethargy; marked mesenteric lymphadenopathy and a focal intestinal thickening seen on abdominal ultrasound	CBC, Biochemistry; Thoracic radiographs; Abdominal ultrasound; FNA mesenteric nodes and spleen	Lymphosarcoma; Stage Vb	UW-19, including l'asparaginase week 1; prednisolone. Clinical deterioration after the first treatment; euthanased 25/02/09
12/02/09 335	Cancer of the Oral Cavity	Aggro Butcher 16yo Mn DSH	Two week history of behaviour change and large ulcerating mass developing within the left mandible; biopsy diagnosis of squamous cell carcinoma	CBC	Squamous Cell Carcinoma;	Neoadjuvant chemotherapy: gemcitabine and carboplatin; pamidronate also administered; meloxicam; buprenorphine. Rapid deterioration; euthanased 18/2/09
16/02/09 336	Tumours of the Intestinal Tract	Leo Alexander 7yo Mn Bengal	Three month history of weight loss and increasing vomiting; focal small intestinal mass seen on abdominal ultrasound	FNA intestinal mass - inconclusive	Lymphosarcoma	Referred for wide excision of intestinal mass for histopathology
17/02/09 337	Perianal Tumours	Ebony States 11yo Fn Cocker spaniel	Chronic anal gland problems for 12 months; acute swelling over left perianal region one week ago; referring vet palpated mass in location of left anal sac; FNA showed pyogranulomatous reaction	CBC, Biochemistry, ionized calcium, U/A; thoracic radiographs; abdominal ultrasound; FNA liver and spleen which were slightly irregular	Chronic pyogranulomatous anal sacculitis with furunculosis	Staging clear so referred for excision of mass for histopathology; no further treatment required
18/02/09 338	Soft Tissue Sarcomas	JD Berryman 9yo Mn cross breed	Mass over right lateral thigh present for 3 months; excisional biopsy diagnosis of intermediate grade soft tissue sarcoma, incomplete excision	CBC, Biochemistry	Soft tissue sarcoma, intermediate grade;	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.25mg/kg piroxicam daily for life (reduced dose due to hepatopathy on bloods)
19/02/09 339	Lymphosarcoma	Ben More 13yo Mn Border Collie	3 week history of increased nodes; progressive lethargy and inappetance over the last week; FNA suggestive of lymphoma	Node biopsy for histopathology and IHC	Lymphosarcoma, B cell centroblastic polymorphic; Stage IVb or higher	UW-19, including prednisolone. Owner stopped treatment after first dose of chemotherapy due to vomiting



19/02/09 340	Soft Tissue Sarcomas	Arnie Gambin 7yo Mn Boxer	2 month history of slowly growing mass over lateral left stifle; FNA suggestive of soft tissue sarcoma	CT scan left hindleg and thorax; FNA left popliteal node	Soft tissue sarcoma, grade 1, moderate margins	Staging clear so referred for surgical excision; moderate margins achieved for low grade sarcoma, therefore only monitoring recommended
20/02/09 341	Ocular Tumours	Max Taylor 14yo Mn cross breed	3 weeks history of sore right eye and mass growing over dorsal right limb; 12 month history of mass over left thorax, now starting to ooze	CBC, Biochemistry; CT scan head	Eye: malignant melanoma Thorax: MCT, grade 3	Referred for enucleation and histopathology
20/02/09 342	Haemangiosarcoma	Bronson Roe 7yo M Boxer	Invasive subcutaneous haemangiosarcoma removed from right thorax with incomplete margins	None	Haemangiosarcoma	Owner declined further diagnostics and treatment
23/02/09 343	Haemangiosarcoma	Cassey Madsen 13yo Fn golden retriever	Collapse one week ago due to haemabdomen; abdominal ultrasound found large splenic mass	None	Open	Owner declined further diagnostics and treatment
24/02/09 344	Lymphosarcoma	Junior Laird 11yo Fn Staffordshire terrier cross	Two week history of generalized lymphadenopathy in a well dog; FNA diagnosis of lymphoma	None	Lymphosarcoma; Stage IIIa or higher	Owner elected palliation
24/02/09 345	Tumours of the Endocrine System	Lucy Mason 9yo fn German shorthaired pointer	Ventral neck mass noted a week ago; mass measures 7x5.5cm but mobile in dorsoventral plane	CT scan neck and thorax; CBC, biochemistry, U/A	Follicular thyroid carcinoma	Referred for excision of mass; adjuvant chemotherapy using doxorubicin every 3 weeks x 6
24/02/09 346	Hepatic Tumours	Poco Papvassiliou 19yo M Tibetan terrier	One month history of vague clinical signs; one week history of lethargy, inappetence and weight loss; thoracic radiographs showed diffuse nodular pattern. Abdominal ultrasound showed multifocal, cavitory masses in liver and spleen	None	Suspected haemangiosarcoma	None. Owner elected euthanasia 25/02/09
26/02/09 347	Perianal Tumours	Jasper Groucutt 9 year old Mn Labrador cross	Short history of passing smaller but more frequent stools; then mass noted near right side of anus a week ago; incisional biopsy diagnosed perianal gland adenocarcinoma	Thoracic radiographs; abdominal ultrasound; FNA enlarged medial iliac nodes	Perianal gland adenocarcinoma	Carboplatin q3wks x 6; piroxicam 0.3mg/kg daily
27/02/09 348	Mast Cell Tumours	Eddie Schwarz 9yo Mn Kelpie cross	Two masses present for 1-2 months; left axilla complete excision of grade 2 (low grade) MCT; left lateral thigh incompletely excised grade 2 (low grade) MCT; another mass noticed medial left thigh	FNA mass medial left thigh	MCT grade 2 (low grade); TNxMx; Stage IIIa	Owner declined further diagnostics and treatment
04/03/09 349	Tumours of the Male Reproductive System	Wilson Murphy 10yo Mn Border Collie	Developed right-sided Horner's syndrome one month prior with no underlying cause found. Then became lame in left hind leg. Diffuse intermuscular mass detected and biopsied: undifferentiated neoplasm, pancytokeratin IHC positive. Developed bleeding from penis within last 24 hours	None	Metastatic carcinoma; primary not located	Owner declined further diagnostics and treatment. Euthanased 04/03/09
04/03/09 350	Lymphosarcoma	Nitus Golovanevskiy 8yo M German shepherd cross	Splenic mass detected on abdominal palpation during routine examination; splenectomy diagnosed splenic marginal zone lymphoma	None	Splenic marginal zone lymphoma	Owner declined further diagnostics and treatment
05/03/09 351	Tumours of the Male Reproductive System	Zane Thornton 10yo Mn Boxer	One month history of dribbling urine. Initial prostatic wash was cultured and treated with appropriate antibiotics. Still dribbling urine so repeat prostatic wash performed and diagnosed prostatic carcinoma on cytology	CBC, Biochemistry	Prostatic carcinoma	Gemcitabine and carboplatin, every 3 weeks x 6; piroxicam 0.3mg/kg/day
05/03/09 352	Lymphosarcoma	Bundy Seath-Shepherd 3yo Mn Rhodesian Ridgeback cross	Mass present on ventral thorax for one month; became progressively enlarged and inflamed; excisional biopsy diagnosed B cell lymphoma	None	Cutaneous B cell lymphoma	Owner declined further staging and treatment

06/03/09 353	Mast Cell Tumours	Nikki Jovanovic 10yo Fn Beagle	Subcutaneous mass on right ventral thorax measuring 3cm diameter noted by referring vet on routine examination; FNA suggested MCT	Marginal excisional biopsy for histopathology and grading	MCT, grade 2 (low grade)	Owner declined further staging and treatment
09/03/09 354	Soft tissue Sarcomas	Lucy Fenner 13yo Fn cross breed	3cm mass over lateral left thigh for two weeks. FNA diagnosed soft tissue sarcoma. Wide excision and histopathology = grade 1 soft tissue sarcoma, incomplete excision	CBC, Biochemistry, U/A; thoracic radiographs	Soft Tissue Sarcoma, grade 1	Owner elected to monitor for disease recurrence
09/03/09 355	Soft tissue Sarcomas	Gemma Muratore 6yo Fn CKCS	Mass over lateral left hock noted 2 weeks prior to presentation to referring vet. Initial FNA suggestive of soft tissue sarcoma. Wide excision and histopathology confirmed diagnosis of low grade STS, incomplete excision	CBC, Biochemistry	Soft Tissue Sarcoma, grade 1	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
09/03/09 356	Mast Cell Tumours	Harry Hill 5yo Mn golden retriever	Mass over left thigh for 2 weeks; FNA diagnosed MCT. At surgery another smaller mass found nearby. Both removed with wide margins; histopathology diagnosed grade 2 (low grade) mast cell tumours, complete excision	FNA left popliteal node; abdominal ultrasound	MCT, grade 2 (low grade) x 2; Stage IIIa	No further treatment required
11/03/09 357	Haemangiosarcoma	Rajah Du Cloux 6yo Mn German Shepherd	Acute onset lethargy and abdominal enlargement. Haemabdomen diagnosed and exploratory laparotomy diagnosed bleeding splenic mass; splenectomy; histopathologic diagnosis of haemangiosarcoma	CBC. biochemistry	Haemangiosarcoma; T2N0M0, Stage II	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
12/03/09 358	Mast Cell Tumours	Thor Ward 9yo Fn cross breed	Rapid appearance and growth of mass over the left caudal thigh; FNA diagnosed mast cell tumour with pyogranulomatous inflammation	CBC, Biochemistry; abdominal ultrasound	CBC, Biochemistry; abdominal ultrasound	Prednisolone 2mg/kg daily was administered for 7 days; marked reduction in inflammation and size of mass but owner declined excisional biopsy
17/03/09 359	Mast Cell Tumours	Billy Sillem 7yo Mn Staffordshire bull terrier	Grade 2 MCT completely resected from right lateral thigh 6 months ago. Recent appearance of mass in right inguinum; wide excision for histopathology diagnosed grade 3 MCT, incomplete excision	Abdominal ultrasound	MCT, grade 3; T1N1M1	Owner elected palliation
18/3/09 360	Mast Cell Tumours	Sheeba Ratcliffe 8yo Fn American pit bull terrier	Mass first developed over proximocaudal right foreleg 2 years ago but resolved and recurred 2 months ago to be inflamed and ulcerated. Excisional biopsy by referring vet diagnosed MCT, grade 2 (low grade), 2mm margins	FNA right prescapular node; abdominal ultrasound	MCT, grade 2 (low grade);	Excision of right prescapular node; adjuvant chemotherapy following Vinblastine/prednisolone protocol
19/03/09 361	Perianal Tumours	Ollie Mellet 12yo Mn Maltese cross	Mass in location of left anal gland detected on routine checkup; FNA suggestive of anal sac adenocarcinoma	Thoracic radiographs; abdominal ultrasound; urinalysis + M/C/S	Anal Sac Adenocarcinoma	Referred for excision of mass. Incomplete excision. Carboplatin every 3 weeks x 6 doses. No recurrence as of Oct 2011.
19/03/09 362	Lymphosarcoma	Murphy Lai 12yo Mn Jack Russell terrier	2 week history of Generalized lymphadenopathy; popliteal node excision diagnosed diffuse intermediate to high grade large cell lymphoma	IHC on previous biopsy; CBC, Biochemistry; abdominal ultrasound; bone marrow aspirate	Lymphosarcoma; centroblastic B cell	UW-19
27/03/09 363	Mast Cell Tumours	Ned Jensen 2yo Mn domestic cat	One month history of mass inside upper right lip. Excisional biopsy diagnosed mast cell tumour, incomplete excision	CBC, Biochemistry; thoracic radiographs; abdominal ultrasound; FNA right submandibular node	Mast Cell Tumour; T0N1M0	Referred for surgical excision of the primary lesion and regional node; followed by adjuvant lomustine every 4 weeks x 6
30/03/09 364	Tumours of the Intestinal Tract	Meiling Burleigh 16yo Fn Siamese cat	3 month history of vomiting with increasing frequency; then developed soft stools with mucus and occasional haematochezia; abdominal ultrasound diagnosed circumferential thickening of descending colon and regional lymphadenopathy	None	Open (suspect lymphoma or carcinoma)	None. Owner elected euthanasia

30/03/09 365	Nasal tumours	Monty Henderson 12yo M golden retriever	One month history of progressive proptosis of the left eye; ultrasound of eye diagnosed retrobulbar mass; abdominal ultrasound diagnosed left adrenal mass	CT scan head and abdomen; FNA retrobulbar mass	Nasal Carcinoma	Doxorubicin/carboplatin alternating every 3 weeks; piroxicam
31/03/09 366	Soft Tissue Sarcomas	Noire Achleitner 9yo Fn domestic cat	3 month history of rapidly growing mass over right thorax. FNA suggestive of mesenchymal neoplasm. Wide excision and histopathology diagnosed high grade fibrosarcoma, close margins	CBC, Biochemistry, U/A; thoracic radiographs; FNA right axillary node	Fibrosarcoma, high grade; TN0M0	Doxorubicin every 3 weeks x 6
01/04/09 367	Lymphosarcoma	Jack Edmondson 9yo M cross breed	Weakness/collapsing episodes which first started 4-5 months ago, now with increasing frequency. Blood tests diagnosed biclonal gammopathy	U/A; thoracic radiographs; abdominal ultrasound; FNA mass within abdomen; bone marrow aspirate	Lymphoma	Referred for surgical excision of mass. Pre-op CT scan showed mass attached to tail of spleen so splenectomy performed
01/04/09 368	Histiocytic Sarcoma	Bailey Barnett 9yo M Doberman	3 month history of vague lethargy. Blood tests unremarkable. Recently splenomegaly noted and splenectomy performed, HP = histiocytic sarcoma; also suspected to have vWD	CBC, Biochemistry, U/A; IHC on splenic biopsy; abdominal ultrasound; bone marrow aspirate	Splenic histiocytic sarcoma	Lomustine every 3 weeks x 8
03/04/09 369	Tumours of the Male Reproductive System	Puck Wall 15yo Mn Kelpie cross	2-3 week history of stranguria, then complete urinary obstruction	None	Prostatic carcinoma	Piroxicam 0.3mg/kg. Re-obstructed after 24 hours and owner elected euthanasia
03/04/09 370	Tumours of the Skin and Subcutaneous Tissues	Missy Grant 2yo Fn Jack Russell terrier	Has had a sore on the caudal left thigh since a pup; has three times grown into a granulomatous lesion which has been resected each time. HP only on first biopsy = marked, focally extensive, chronic, epidermal and adnexal papillomatous hyperplasia and hyperkeratosis with marked acantholysis and cystic hyperkeratosis and pyogranulomatous furunculosis. Referred for suspected underlying papillomavirus	None	Open	Appearance and history was not consistent with papillomavirus. Plan was to re-biopsy for HP and PCR, but owner reported lesions had not progressed so no further diagnostics or treatment performed.
06/04/09 371	Mast Cell Tumours	Rustee Eaves 5yo Fn Boxer	Mass present on lateral left hind for one year with recent growth and irritation; FNA suggested MCT so referring vet performed wide excision; HP = MCT, grade 2 (low grade), complete excision	FNA regional lymph node (popliteal); FNA small nodule along suture line	MCT, grade 2 (low grade)	No further treatment required; monitor for new primary cutaneous tumours
06/04/09 372	Soft Tissue Sarcomas	Shay Purslowe 10yo Fn Rottweiler cross	One month history of 3 masses developing over the right dorsal antebrachium. Incisional biopsies diagnosed undifferentiated sarcomas.	Thoracic radiographs; FNA right prescapular node	Undifferentiated sarcoma; TN1M)	Marginal excision of primary tumours and regional node, followed by adjuvant metronomic chemotherapy
07/04/09 373	Soft Tissue Sarcomas	Jinx Letherby 15yo Fn DSH	Mass removed from dorsal neck 6 months ago, no histopathology performed. Regrew in the last month and now measures 6x6.5cm and overlies left shoulder	CBC, Biochemistry, U/A; CT scan left shoulder and thorax	Open – suspect high grade soft tissue sarcoma with pulmonary metastases	Owner declined further treatment
07/04/09 374	Tumours of the Skeletal System	Winnie Saunders 10yo Fn Rhodesian ridgeback	Acute onset swelling and lameness of right proximal antebrachium; radiographs showed monostotic, geographical lytic lesion of proximal ulna with pathological fracture	None	Open	Owner elected euthanasia
08/04/09 375	Lymphosarcoma	Bono McDonald 9yo Mn cross breed	Generalized lymphadenopathy in a well dog; no diagnostics before referral	CBC, Biochemistry, U/A; FNA node	Lymphosarcoma, Stage IIIa or higher	Doxorubicin every 3 weeks x 6

09/04/09 376	Tumours of the Intestinal Tract	Dingo Menezes 12yo Mn cross breed	2 month history of inappetance progressing to vomiting and diarrhoea and weight loss. Abdominal ultrasound showed multiple areas of small intestinal thickening and enlarged mesenteric nodes. FNA of nodes diagnosed lymphoma	CBC, Biochemistry, electrolytes, U/A; Serum folate and B12 assay	Intestinal lymphoma	UW-19 including L'asparaginase and prednisolone. Dog developed increased fresh blood loss through bowel after first chemotherapy treatment and was administered a blood transfusion; repeat abdominal ultrasound after 2 treatments showed partial remission but dog did not improve clinically and had persistent melena and moderate anaemia.
14/04/09 377	Perianal Tumours	Beau Cunningham 12yo Mn Cocker spaniel	Right anal gland disease for 3 years with recent mass development; FNA suggestive of anal sac adenocarcinoma; possible PU/PD	CBC, Biochemistry, iCa, U/A; thoracic radiographs; abdominal ultrasound	Anal Sac Adenocarcinoma	Referred for excisional biopsy of mass. Dog developed post-operative complications and died within 24 hours.
14/04/09 378	Tumours of the Skin and Subcutaneous Tissues	Ally Hanley 10yo Fn DSH	4 week history of lethargy, then inappetance. Multiple dermal nodules and abdominal mass palpable. FNA skin and abdominal mass suggestive of lymphoma. Biopsy of cutaneous nodule confirmed discrete cell neoplasia.	CBC, Biochemistry, U/A; IHC (CD3, CD79a) on previous biopsies	Cutaneous T cell lymphoma with abdominal involvement	Owner declined further diagnostics. Elected to treat with oral cyclophosphamide every 3 weeks x 6 doses. Marked clinical improvement for the first 24 hours after the first treatment, then deteriorated, and euthanased 28/04/09
15/04/09 379	Renal Cancer	Fuzzy Wuzzy Busby 11yo Mn Persian cat	Lethargy and inappetance for one week. Bilateral renomegaly palpated. Abdominal ultrasound diagnosed changes of the kidneys pathognomonic for lymphoma. Started on prednisolone prior to referral	CBC, Biochemistry, electrolytes, U/A	Renal lymphoma	Intravenous fluids for 24 hours; oral cyclophosphamide every 3 weeks x 6 doses; oral prednisolone as tapering course over first month. Improved clinically after first dose of chemotherapy;
15/04/09 380	Lymphosarcoma	Darcy Roberts 8yo Mn Border Collie cross	Generalized lymphadenopathy for 2 weeks; otherwise well dog; FNA suggestive of lymphoma	Node biopsy for HP and IHC; abdominal U/S; bone marrow aspirate; CBC, Biochemistry, U/A	Lymphoma, B cell Burkitt's; Stage IVa	UW-19
16/04/09 381	Mast Cell Tumours	BJ Nash 12yo Mn Shih Tsu	7 months ago had mass develop lateral left thigh; FNA suggestive of MCT but excisional biopsy showed only myositis and pyogranulomatous reaction	FNA left popliteal node		Prednisolone 2mg/kg sid for 7 days then tapering; soft tissue swelling reduced leaving more discrete mass; ultrasound of mass and abdomen
20/04/09 382	Lymphosarcoma	Daisy Nairn 9yo Fn Rottweiler	3-4 week history of enlarged nodes; FNA suggestive of lymphoma	CBC, Chemistry	Lymphoma	Oral Lomustine every 3 weeks x 6. Grade 4 neutropenia after first dose
21/04/09 383	Lymphosarcoma	Rusty Morgan 10yo Mn Cocker Spaniel	One week of lethargy; enlarged nodes noted yesterday; FNA suggestive of lymphoma; CP2 unremarkable	Node biopsy for HP and IHC	Lymphoma	UW-19. Marked ileus and abdominal pain after first vincristine; abdominal radiographs and ultrasound showed no abnormalities; resolved with metoclopramide
22/04/09 384	Mast Cell Tumours	Holly Groman 15yo Fn cross breed	3 years ago had a grade 2 MCT incompletely resected from right upper lip. No concerns until 3 months ago when mass developed in same location with FNA suggestive of MCT.	Incisional biopsy of mass; FNA right submandibular lymph node	MCT	Owners elected palliation: 2mg/kg prednisolone sid for 7 days then 1mg/kg sid ongoing; omega-3 fish oil; gut protectants if needed
23/04/09 385	Lymphosarcoma	Bella Rees 7yo Fn Boxer	1-2 week history of pruritic nodular skin disease with generalized lymphadenopathy. FNA suggestive of lymphoma. Node biopsy confirmed the diagnosis.	CBC, bone marrow aspirate	Lymphoma, Stage Vb	UW-19; owner stopped treatment after first dose when results of marrow aspirate returned; maintained on prednisolone 1mg/kg daily
23/04/09 386	Lymphosarcoma	Amber Rodda 5yo Fn Doberman	2 days of enlarged superficial nodes; FNA suggestive of lymphoma	CBC, Biochemistry	Lymphoma, Stage IIIa or higher	UW-19
24/04/09 387	Mast Cell Tumours	Emmy Saunders 5yo Fn Staffordshire Bull Terrier	Mass present over lateral left thigh for 12 months with rapid growth in the last month; excisional biopsy diagnosed grade 2 (high grade) MCT, narrow margins	CBC, Biochemistry; FNA left inguinal node; abdominal ultrasound	MCT Grade 2 (high grade); TNM	Vinblastine x 8; prednisolone

28/04/09 388	Tumours of the Intestinal Tract	Smudge Jelly 14yo Mn DSH	2 months of inappetance progressing in the last week; abdominal mass encircling small intestinal segment	CBC, Biochemistry, U/A; FNA intestinal mass	Lymphosarcoma	UW-25. Persistent anorexia so oesophageal feeding tube inserted; euthanased 13/5/09
28/04/09 389	Lymphosarcoma	Basil Smith 8yo Mn Beagle	3 months of increasing upper airway noise; one month of generalized lymphadenopathy and hepatosplenomegaly; node biopsy diagnosed lymphoma; treated with prednisolone	CBC, Biochemistry, U/A; bone marrow aspirate	Lymphoma, centroblastic, polymorphic B cell; Stage Va	UW-19
28/04/09 390	Tumours of the Skin and Subcutaneous Tissues	Misty Curel 8yo Fn Jack Russell terrier	One month of lesion on right metatarsal pad; biopsy could not distinguish between carcinoma and round cell tumour (possible plasmacytoma)	IHC on biopsy sample	Likely plasmacytoma	Owner declined curative surgical excision; monitoring only
28/04/09 391	Tumours of the Intestinal Tract	Lola Rennick 11yo Fn Burmese	One week of anorexia and dyspnoea; pleural effusion and abdominal masses noted; abdominal ultrasound diagnosed cranial mesenteric lymphadenopathy; FNA of nodes diagnosed lymphoma	CBC	Lymphoma	UW-25
29/04/09 392	Tumours of the Mammary Gland	Stubbree Lim 13yo Fn Samoyed	3 month history of 2 caudal mammary masses which have grown in this time; 2 lateral thoracic radiographs suggest 3 small pulmonary nodules	None	Mammary carcinoma	Owner declined further diagnostics and treatment
29/04/09 393	Tumours of the Skin and Subcutaneous Tissues	Baci Euphemie 12yo Fn Cocker spaniel	Had several masses removed 6 months ago which were not tested. 2 new lumps grew over dorsum in the last 2 weeks, different appearance; excisional biopsy diagnosed cutaneous lymphoma	IHC	Cutaneous T cell lymphoma	Initial monitoring; new lesion developed over left stifle, FNA consistent with lymphoma; no response after one week to Lomustine therefore marginal surgical excision
30/04/09 394	Plasma Cell Neoplasms	Riley Francis 12yo Fn cross breed	2 oral lesions developed a few months ago and were removed – HP = oral plasmacytomas; one regrew and was removed a second time; on third regrowth – referred for assessment	None	Oral plasmacytoma	Owner declined further diagnostics and staging
01/05/09 395	Cancer of the Oral Cavity	Tyne Wigglesworth 13yo Fn Greyhound cross	Had trouble eating 3 months ago so dental prophylaxis performed and 2 upper right molar teeth removed; gum didn't heal post operatively so biopsy of maxilla taken - SCC	CBC, Biochemistry; CT scan head and thorax	Oral squamous cell carcinoma	Carboplatin and pamidronate every 3 weeks x 6; piroxicam 0.3mg/kg daily for life. Owner stopped chemotherapy after 2 doses but continued piroxicam monotherapy
01/05/09 396	Cancer of the Oral Cavity	Kinta Wills 13yo Fn Rhodesian Ridgeback cross	Large, black mass attached to right inner cheek noted on routine examination	Excisional biopsy of mass; FNA right submandibular lymph node	Oral melanocytoma with nodal metastasis	Owner declined further diagnostics and treatment
05/05/09 397	Mast Cell Tumours	Holly Oates 9yo Fn Kelpie cross	Subcutaneous mass removed from right prescapular region; HP = high grade mast cell tumour, possible metastatic lesion to node	CBC, Biochemistry, U/A; thoracic radiographs; abdominal ultrasound; bone marrow aspirate cytology	MCT, grade 3	Imatinib 5.5mg/kg sid for 14 days; concurrent Vinblastine/ Lomustine/ prednisolone protocol
06/05/09 398	Lymphosarcoma	Cobi Rose 4yo Fn Boxer	One week history of lymphadenopathy; FNA suggestive of lymphoma; HP on popliteal node biopsy confirmed diffuse high grade large immunoblastic lymphoma	CBC, Biochemistry; bone marrow aspirate	Diffuse high grade large immunoblastic lymphoma; Stage V	UW-19 including L'asparaginase and prednisolone
06/05/09 399	Plasma Cell Neoplasms	Molly Dillon 11yo Fn DLH cat	Sudden onset lethargy and inappetance; improved with antibiotics but monoclonal gammopathy diagnosed on blood tests	CBC, Biochemistry, U/A; thoracic radiographs; abdominal ultrasound; bone marrow aspirate cytology	Multiple myeloma	Owner declined treatment
07/05/09 400	Mast Cell Tumours	Shamus Adams 8yo Mn Beagle	Small mass attached to base of right pinna for 12 months; recent change in appearance to become more firm and fixed.	CBC, Biochemistry, U/A; abdominal ultrasound; FNA right submandibular node	MCT, Grade 2 (low grade)	Vinblastine/prednisolone protocol

07/05/09 401	Urinary Bladder Cancer	Spot Lannu 12yo Fn Jack Russell terrier	One month history of stranguria and haematuria not responsive to antibiotics. Abdominal ultrasound showed mass attached to bladder apex		Open – suspect transitional cell carcinoma; DDx SCC, rhabdomyosarcoma, granulomatous or polypoid cystitis	Piroxicam 0.3mg/kg sid
07/05/09 402	Lymphosarcoma	Scooby Borushek 9yo Mn Cocker spaniel	2-3 week history of black mass attached to lower right lip; excisional biopsy for HP and IHC diagnosed T cell lymphoma	FNA superficial lymph nodes; thoracic radiographs; abdominal ultrasound; bone marrow aspirate	Solitary cutaneous T cell lymphoma	Monitoring initially
08/05/09 403	Tumours of the Intestinal Tract	Pushkin Kelsall 9yo Mn Russian Blue cat	2 months history of progressive weight loss, inappetance and now anorexia. No vomiting or diarrhoea. Abdominal ultrasound showed small intestinal mass and regional lymphadenopathy; FNA diagnosed lymphoma	CBC, Biochemistry, U/A	Intestinal lymphoma	UW-25. Achieved partial remission after first cycle of treatment but had persistent anorexia; died 05/06/09
08/05/09 404	Lymphosarcoma	Buzz Bower-White 8yo Mn Boxer	Mass noted under neck 4 weeks ago. FNA suspected lymphoma. Incisional biopsy performed with IHC that confirmed T cell lymphoma	CBC, Biochemistry, U/A; Thoracic radiographs; Abdominal ultrasound; Bone Marrow aspirate	Solitary Cutaneous T cell Lymphoma	UW-19. Minimal response after first cycle so l'asparaginase administered with vincristine treatment 5. Complete remission achieved therefore vincristine/l'asparaginase given fortnightly for another 2 treatments
08/05/09 405	Haemangiosarcoma	Jake Kriwopischin 13yo Mn German Shepherd	Acute onset collapse 5 days ago; bleeding splenic mass diagnosed and splenectomy performed; thoracic radiographs unremarkable	CBC, Biochemistry	Haemangiosarcoma	Owner declined further diagnostics and therapy. Likely recurrence 24/06/09 so euthanased at referring vet
11/05/09 406	Tumours of the Endocrine System	Bedford Berryman 9yo Mn Beagle	Mass noted under neck 5 months ago; FNA 'non-diagnostic'. Growth of mass and progressive upper airway dyspnoea. Neck ultrasound demonstrated right thyroid mass; repeat FNA suggested thyroid carcinoma	CBC, Biochemistry; CT neck and thorax	Thyroid carcinoma; bilateral, metastatic	Doxorubicin every 2 weeks x 6. Euthanased 19/05/09 due to disease progression
12/05/09 407	Haemangiosarcoma	Woody Barry 11yo Mn Cocker spaniel	Acute onset lethargy. Initial bloods unremarkable; abdominal ultrasound diagnosed splenic mass and haemabdomen; splenectomy performed; small masses visualized in liver at time of surgery	CBC, Biochemistry, U/A	Haemangiosarcoma	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Euthanased 23/06/09 due to disease recurrence
14/5/09 408	Tumours of the Male Reproductive System	Jack Martin 12yo Mn Kelpie	3 week history of flat, ribbon-like faeces and faecal tenesmus	CBC, Biochemistry; thoracic radiographs; lumbar spinal radiographs; needle core biopsy of prostate for HP and C+S	Prostatic carcinoma	Carboplatin/gemcitabine q3weeks x 6. Grade 4 gastrointestinal side effects after first dose therefore dose reduction for subsequent treatments
15/05/09 409	Lymphosarcoma	Sam Duncan 5yo Mn Bernese Mountain Dog	One week history of generalized lymphadenopathy. FNA diagnosis of lymphoma	CBC, Biochemistry, U/A	Lymphosarcoma; Stage IIIa	UW-19. Euthanased 9/6/09 after no response to treatment
15/05/09 410	Mast Cell Tumours	Benson Hughes 11yo M Labrador	Mass on scrotum for a couple of years that was slowly growing, then grew fairly large so was removed 18 months ago. No HP done; no recurrence. 2 days ago a mass was noted in groin. Saw RV and both inguinal nodes palpated to be enlarged. FNA of both suggest MCT	Abdominal ultrasound	MCT, grade unknown; primary lesion unknown; metastasis to both inguinal nodes and left medial iliac node	2 weeks imatinib and prednisolone, followed by Vinblastine/lomustine protocol. Recurrence and new skin lesions by treatment 4; repeat abdominal ultrasound showed medial iliac node still enlarged
15/05/09 411	Leukaemias and Myeloproliferative Disorders	Simba Walker 9yo Mn Labrador	3 weeks history of lethargy, then pyrexia and weight loss over the last 10 days. CBC indicated pancytopenia with large number of large lymphoblasts in circulation; presumed ALL	Bone marrow aspirate; CBC	Acute Lymphoblastic Leukaemia	UW-19 with L'asparaginase and prednisolone. Succumbed to disease after 3 weeks

22/06/09 412	Tumours of the Mammary Gland	Sheeba Dimopoulos 12yo Fn Rottweiler	Mass present and progressive within mammary gland 2 left side; referring vet radiographs suspected metastatic disease but on assessment by radiologist, more likely osteomas	CBC, Biochemistry; FNA left axillary node; abdominal ultrasound		Referred back to referring vet for surgical excision of mass and also removal of pea-sized mass in mammary gland 4 left side
29/06/09 413	Ocular Tumours	Jetsom Kuparinen 14yo Fn DSH	Mass first present 6 months prior, then marginal excision 3 months ago; HP = SCC, narrow margins. Recurrent and progressive local disease. Cat also PU/PD and occasional vomiting	CBC, Biochemistry, T4, U/A	Squamous cell carcinoma	Owner declined referral for complete surgical excision. Returned one month later with marked disease progression warranting euthanasia
01/07/09 414	Renal Tumours	Keanu Port 2yo Mn Russian Blue cat	3-4 week history of PU/PD and progressive inappetance; bilateral renomegaly; mesenteric lymphadenopathy; routine blood and urine tests indicate renal failure, and moderate/marked anaemia	None	Open – DDx lymphoma, myeloma, renal carcinoma, renal amyloidosis	Owner declined further diagnostics and therapy; trialed prednisolone 2mg/kg daily and tapering
02/07/09 415	Lymphosarcoma	Kane Evans 7yo M German Shepherd	2 week history of inappetance and marked weight loss. Generalized lymphadenopathy and bilateral uveitis. FNA diagnosis of lymphoma. Circulating atypical mononuclear cells	CBC	Lymphosarcoma, likely StageVb	UW-19 including prednisolone. Recurrence of disease at second last treatment.
02/07/09 416	Lung Tumours	Ruby Bovell 16yo Fn DSH cat	Swelling above the left carpus 6-8 weeks ago. Radiographs of antebrachium showed soft tissue swelling around the distal antebrachium with periosteal reaction of the underlying radius, extending on the medial cortex from mid-diaphysis to distal metaphysis. Incisional biopsy = undifferentiated carcinoma, pancytokeratin positive	Abdominal ultrasound; thoracic and left antebrachium radiographs	Solitary pulmonary nodule – open diagnosis; carcinoma distal antebrachium suspected to be metastatic lesion	Referred for amputation of the limb. Owner declined adjuvant chemotherapy
03/07/09 417	Tumours of the Skeletal System	Kosta Brouwer 9yo Mn Rottweiler	One month history of lameness left foreleg. Initial improvement on NSAIDs then deterioration. Mid-humeral bone lesion seen on radiographs	Repeat radiographs of the left humerus one month after presentation	Open – suspected osteosarcoma	Palliation – carprofen, then codeine also
03/07/09 418	Tumours of the Skin and Subcutaneous Tissues	Taj McNally 5yo Mn Manchester terrier	6 month history of mass right flank slowly increasing in size; excisional biopsy diagnosis of malignant melanoma, complete excision, mitotic index 7/10hpf, nuclear atypia 3/10hpf	Thoracic radiographs; abdominal ultrasound	Malignant melanoma	Monitoring only. Lost to follow up
03/07/09 419	Cancer of the Salivary Glands	Odette Hancock 9yo Fn DSH cat	3-4 week history of mass palpable in the right submandibular region and a change to the purr; FNA of masses suggestive of carcinoma	CT scan head, neck and thorax; referred for incisional biopsies of mass bilaterally	Poorly differentiated adenocarcinoma	Carboplatin and gemcitabine. No response to treatment after 2 doses of chemotherapy. Euthanased.
06/07/09 420	Tumours of the Skin and Subcutaneous Tissues	Jago McKay 13yo schnauzer cross	3 month history of swollen toe 5 right hind foot, partially responsive to antibiotic therapy; toe amputated and sent for HP = subungual squamous cell carcinoma, likely complete excision	None	Subungual SCC	Owner declined further diagnostics and therapy
06/07/09 421	Mast Cell Tumours	Tina Quinn 11yo Fn Whippet	Mass on left side present 3-4 weeks and doubled in size in that time. Wide excision of mass; HP = grade 3 MCT, complete excision	CBC, Biochemistry, U/A; thoracic and abdominal radiographs	MCT, Grade 3	Owner declined adjuvant chemotherapy
07/07/09 422	Mast Cell Tumours	Duke Mudford 8yo Mn cross breed	Two masses on ventral abdomen present 4 months with minimal growth. Excision of masses; HP = low grade, Grade 2 MCTs narrow margins	None	MCT x 2, Grade 2 (low grade); Stage IIIa	Owner elected no further treatment; monitoring only
08/07/09 423	Tumours of the Intestinal Tract	Fozzie Bear Wilshaw 9yo Mn Chow Chow	Two year history of intermittent bouts of 'GIT disease/pancreatitis'. Recent bout more severe. Abdominal ultrasound showed intestinal mass. Exploratory laparotomy removed 4cm mass attached to caecum; HP = leiomyosarcoma (CD117 negative)	None	Leiomyosarcoma	Monitoring with abdominal ultrasound every 3 months. First ultrasound normal, then moved to Melbourne and lost to follow up.

09/07/09 424	Perianal Tumours	Rocky Mollica 10yo Mn Keeshond	Anal gland mass noted 3 weeks ago. Bloods show mild serum hypercalcaemia; marked weight loss; incisional biopsy diagnosed anal sac adenocarcinoma	None	Anal Sac Adenocarcinoma	None. Owner elected euthanasia
09/07/09 425	Soft Tissue Sarcomas	Toby Gasmier 2yo Mn crossbreed	4 week history of mass that developed in the left front foot, on both dorsal and palmar surfaces. Ultrasound showed mass tracking between metacarpals III and IV; marginal excisional biopsy haemangiopericytoma, grade 2	None	Haemangiopericytoma, Grade 2	Owner declined further diagnostics and monitoring at this time; may consider limb amputation at the time of disease recurrence
13/07/09 426	Tumours of the Skeletal System	Zeus Josey 7yo Mn Rottweiler	Had an injury of left foreleg as pup and intermittently lame on this leg. The last month has been lame which is non-responsive to analgesics and now progressive. Radiographs demonstrated aggressive bone lesion proximal humerus	CBC, Biochemistry, U/A; FNA left prescapular node; thoracic and pelvic radiographs	Open – suspect osteosarcoma	Owner declined definitive treatment; palliation with carprofen and tramadol
13/07/09 427	Lymphosarcoma	Scruffy Farrell 13yo Fn DLH cat	3-4 weeks of inappetance and weight loss, then more recently vomiting and diarrhoea; enlarged nodes seen on abdominal ultrasound; generalized lymphadenopathy on physical examination; FNA suggestive of lymphoma	None	Lymphosarcoma	None. Owner declined further diagnostics and treatment
13/07/09 428	Tumours of the Skeletal System	Rocket Thompson 8yo Mn Beagle	Left facial swelling for at least 3 months, slowly progressing. FNA – possible sarcoma	None	Maxillary fibrosarcoma	Marginal excision of mass, followed by metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Recurrence of disease; euthanased November 2010.
14/07/09 429	Urethral Tumours	Jedda Hutchinson 13yo Fn terrier cross	10 month history of screaming when toileting. Extensive work up by referring veterinarian investigated GIT disease but no final diagnosis. More recently showed haematuria and investigation diagnosed urethral thickening	CBC, Biochemistry	Open – suspected urethral carcinoma	Mitoxantrone every 3 weeks x 6; piroxicam 0.3mg/kg daily. Excellent clinical response after first dose with few side effects; however, owner declined further mitoxantrone and maintained on piroxicam only
16/07/09 430	Mast Cell Tumours	Nugget Honore 5yo Mn Ridgeback cross	Two MCTs recently excised: one grade 2 (low grade) and one grade 1	FNA right axillary and right prescapular nodes; thoracic radiographs; abdominal ultrasound	MCT; grade 2 (low grade) and grade 1; Stage IIIa	No further treatment required; monitoring every 3 months
21/07/09 431	Mast Cell Tumours	Boss Webster 7yo Mn Pug	Mass present on dorsal right front foot for about 12 months; excisional biopsy – grade 1 mast cell tumour, incomplete excision	CBC, Biochemistry, U/A; FNA right prescapular node; thoracic radiographs; abdominal ultrasound	MCT; grade 1; Stage	Vinblastine/prednisolone protocol
22/07/09 432	Tumours of the Skeletal System	Daisy Turner 7yo Fn Great Dane cross	First became lame 7 months ago and was diagnosed with suspected osteosarcoma 5 months ago based on radiographic appearance of distal radial lesion; since then treated with carprofen and tramadol. Minimal disease progression	CBC, Biochemistry, U/A; FNA left prescapular node; thoracic radiographs; radiographs of left distal radius	Osteoblastic osteosarcoma (grade 1)	Referred for forequarter amputation; followed by adjuvant chemotherapy: doxorubicin x 2, carboplatin x 4.
22/07/09 433	Soft Tissue Sarcoma	Mickey Hegedus 10yo Mn Border Collie cross	Mass over left elbow noted 2 weeks ago. Marginal excision diagnosed haemangiopericytoma, grade 1, incomplete excision	CBC, Biochemistry, U/A; FNA mass; thoracic radiographs	Haemangiopericytoma, Grade 1	None. Recommended referral for marginal excision of mass, to be followed by metronomic chemotherapy. Owner declined further treatment at this stage
23/07/09 434	Nasal Tumours	Satan O'Malley 12yo Mn Border Collie	Six week history of gagging and snoring. 2 weeks ago had acute epistaxis from left nostril. Rhinoscopy and curette diagnosed chondrosarcoma, MI 20/10hpf	None	Nasal chondrosarcoma	None. Dog had another bilateral epistaxis episode and owner elected euthanasia



24/07/09 435	Tumours of the Skeletal System	Could A Bridson 7yo Mn Rottweiler	Left CCL repaired 18 months ago. Now 3 week history of LHL lameness. L stifle radiographs show geographic lysis of distal L femur	CBC, Biochemistry, U/A; thoracic radiographs; radiographs L and R stifles, L and R elbows and hips; Jamshidi biopsy distal femur	Osteoblastic to fibroblastic osteosarcoma	Medical therapy only – Doxorubicin x 2, Carboplatin x 4; pamidronate; NSAIDs; tramadol; gabapentin
24/07/09 436	Lymphosarcoma	Jackson Terry 8yo Mn Bichon Frise	2 month history of progressive lameness RHL. 3 week history of generalized lymphadenopathy. Node biopsy diagnosed diffuse intermediate to high grade large cell lymphoma	None	Lymphosarcoma, Stage IIIa or higher	Owner declined further diagnostics and treatment
27/07/09 437	Tumours of the Mammary Gland	Bay Monkhouse 12yo Fn Beagle	18 months ago had grade 1 STS removed from left axilla. Speyed at same time. Recent recurrence of that mass - repeat removal and other lumps removed: one over mammary gland 4 right side (mammary carcinoma), another small one MG 3 LHS (not tested), and a firmer mass over right rump (intermediate grade sarcoma)	CBC, Biochemistry, iCa, U/A; FNA right inguinal LN; thoracic radiographs; abdominal ultrasound; ACTH stimulation test	Mammary carcinoma; soft tissue sarcomas x 2	Referred for further surgery: right side mammary chain strip and further surgery of soft tissue sarcoma right rump. Complete excision with no poor prognostic indicators; no further treatment required
28/07/09 438	Nasal Tumours	Jessie Jarrett 12yo Fn Heeler cross	8 months since first epistaxis. Repeat episode 6 months ago and investigation elsewhere via CT scan and biopsy performed. CT scan showed left sided nasal mass with lysis of the orbit and extension into the nasopharynx; biopsies only demonstrated inflammatory rhinitis. Managed with piroxicam only since, but now a mass is protruding through left frontal sinus	CBC, Biochemistry, iCa, U/A; FNA mass left frontal sinus	Nasal carcinoma; hypercalcemia	Owner declined pamidronate to lower iCa. Continue piroxicam at 0.2mg/kg daily. Commence CTX 10mg sid.. Disease progression after one month therefore stopped cyclophosphamide and maintained on piroxicam and codeine for analgesia
31/07/09 439	Lymphosarcoma	Kiara Chilton 2yo F Birman cat	Two week history of lethargy and inappetence; abdominal mass palpated and seen on ultrasound to be associated with the small intestine.	FNA enlarged nodes – suggestive of reactive lymph node. Exploratory laparotomy and excision of mass for histopathology	FIP granuloma	None. Euthanased
03/08/09 440	Cancer of the Nasal Planum	Smut Jenkins 12yo Mn domestic cat	8 month history of small non healing wound left nasal planum. Histofreezed 2 months ago by ref vet. Now marked progression with lesion measuring 3x10mm	None	Squamous Cell Carcinoma	Nosectomy
03/08/09 441	Mast Cell Tumours	Gromet Cooper 9yo Fn Bull terrier cross	One month history of waxing and waning mass over lateral left hock. Incisional biopsy diagnosis of MCT grade 2 (low grade); marked post-biopsy swelling and persistent bleeding/ooze	Abdominal ultrasound; FNA left popliteal lymph node	MCT, Grade 2 (low grade)	None. Palliation with omega-3 fish oils; prednisolone, GIT protectants as required
04/08/09 442	Cancer of the Oral Cavity	Bear Varley 11yo Mn Kelpie	3cm ulcerated mass noted in right upper buccal fold 2 weeks ago. Marginal excisional biopsy diagnosed malignant melanoma; MR 40/10 hpf and nuclear atypia 5/10hpf	None	Oral Malignant Melanoma	None. Owner declined further diagnostics and therapy
06/07/09 443	Tumours of the Endocrine System	Defar Grandidge 12yo Fn Kelpie cross	Change in bark noted 2 months ago. One week ago collapsed on walk. Ref vet noted mass in left jugular groove; FNA suggestive of thyroid carcinoma	CT scan neck and thorax	Thyroid carcinoma	Referred for surgical excision of mass. Post operative complications due to laryngeal paralysis; owner elected euthanasia
07/07/09 444	Lymphosarcoma	Jake Parkin 8yo Mn Boxer	Sudden onset urinary incontinence. Bloods showed mild serum hypercalcaemia and no azotaemia. Thoracic and abdominal radiographs taken – cranial mediastinal mass; Ultrasound guided FNA of mass suggestive of lymphoma	CBC; iCa	Lymphosarcoma, cranial mediastinal	One dose pamidronate, followed by UW-19. Early response but then recurrence mid-protocol and euthanased.

12/08/09	Tumours of the Mammary Gland	Chanel Trapuzzano 11yo Fn Pomeranian	3-4 week history of rapidly growing mass to 4cm in the right mammary gland 5. Wide excisional biopsy diagnosed high grade mammary carcinoma, incomplete excision with evidence of tumour cells in vessels	CBC, Biochemistry, U/A; thoracic radiographs; abdominal ultrasound	Mammary carcinoma; T2NM	Doxorubicin every 2 weeks x 5. Lost to follow up.
445						
13/08/09	Haemangiosarcoma?	Lucy Huxtable 10yo Fn Labrador	3 week history of being 'not right' and abdominal pain noted by referring vet. Abdominal ultrasound showed one small hepatic nodule and 2 small splenic nodules. FNA of liver nodule suggestive of sarcoma.	CT scan thorax and abdomen – multiple nodules in liver, spleen and lungs	Sarcoma, metastatic (suspect haemangiosarcoma)	None. Owner elected euthanasia
446						
13/08/09	Cancer of the Nasal Planum	Timmy Sharp 18yo Mn DMH cat	Had pinnae removed years ago for SCC and had nose treated with cryosurgery at same time. Has had a lesion on nose now for 8-12 months which has slowly progressed	CBC, Biochemistry, U/A; thoracic radiographs; biopsy of nasal planum lesion	Squamous Cell Carcinoma	Cryosurgery
447						
14/08/09	Soft Tissue Sarcomas	Nala Murray 10yo Fn golden retriever	5 month history of small mass adjacent left medial canthus. Excisional biopsy diagnosed soft tissue sarcoma, grade 1, 1mm margins	CBC, Biochemistry, U/A	Soft Tissue Sarcoma, Grade 1	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
448						
18/08/09	Tumours of the Skeletal System	Rosie Smith 10yo Fn Labrador	Four week history of acute onset lameness on right hindleg after jumping onto bed. Radiographs showed mainly lytic lesion of distal right femur. Biopsy diagnosed osteoblastic osteosarcoma	CBC, Biochemistry	Osteoblastic osteosarcoma	Amputation of limb followed by adjuvant chemotherapy: doxorubicin x 2, carboplatin x 4. Euthanased 6/12/10 due to bone and pulmonary metastases
449						
19/08/09	Lymphosarcoma	Bonny Sabadima 10yo Fn Staffordshire Bull Terrier	Two week history of enlarged peripheral lymph nodes; FNA suggestive of lymphoma	None	Lymphoma; Stage IIIa	None. Owner declined further diagnostics and treatment; lost to follow up
450						
19/08/09	Soft Tissue Sarcomas	Chloe Van Tiel 12yo Fn Bull Terrier cross	3-4 month history of mass slowly enlarging over left face. Excisional biopsy diagnosed high grade soft tissue sarcoma, incomplete. Staging tests performed by referring veterinarian.	None	Soft Tissue Sarcoma; high grade	Electrochemotherapy of surgery wound. Then commenced metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
451						
20/08/09	Lymphosarcoma	Max Callaghan 9yo Mn Kelpie cross	Dyspnoea for one week; weight loss noted with hindsight. Thoracic radiographs and ultrasound diagnosed extensive cranial mesenteric mass with pleural effusion; FNA of mass showed population of small lymphocytes	CBC, Biochemistry, ionized calcium, U/A	Small cell lymphoma or lymphocyte-rich thymoma	UW-19
452						
21/08/09	Cancer of the Oral Cavity	Diesel Cruden 5yo Mn Norwegian Elkhound	3-4 week history of owner noticing the right lower lip drooping, then swelling of mandible noted.	CT scan head and thorax; biopsy of soft tissue swelling right mandible	Oral Fibrosarcoma	Referred for partial mandibulectomy
453						
24/08/09	Soft Tissue Sarcomas	Bear Hayles 11yo Mn Labrador cross	10 day history of mass noted in right axilla; FNA suggestive of high grade soft tissue sarcoma	CBC, Biochemistry; CT mass and thorax	Liposarcoma, intermediate grade	Referred for marginal excision of mass; followed by metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life. Developed oral melanoma March 2011. Euthanased May 2011 due to osteoarthritis
454						
24/08/09	Soft Tissue Sarcomas	Ebony Kelly 6yo Fn DSH cat	Two week history of left foreleg lameness then 2 day history of firm non painful swelling over left carpal joint. Radiographs showed radiocarpal dislocation. FNA of mass showed anaplastic cells suspicious of sarcoma	Incisional biopsy	Undifferentiated anaplastic sarcoma	Referred for left forelimb amputation; followed by doxorubicin every 3 weeks x 6
455						
26/08/09	Soft Tissue Sarcomas	Olive Kester 9yo Fn Labrador	4cm diameter mass found near right tail base on routine check up. Wide excision and histopathology diagnosed spindle cell tumour, high grade, marginal excision	CBC, Biochemistry; Abdominal ultrasound	Soft Tissue Sarcoma; high grade	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
456						

28/08/09	Lymphosarcoma	Calvin Franks 7yo Mn DSH cat	2-3 week history of inappetance and weight loss. Abdominal ultrasound showed marked hepatosplenomegaly and multiple enlarged mesenteric/inguinal nodes. FNA suggestive of lymphoma.	CBC, Biochemistry	Lymphosarcoma	UW-25. Owner stopped treatment after first dose due to financial reasons
457						
31/08/09	[Hepatic Tumours]	Oswald Lawrence-Ward 11 yo Mn Maltese cross	6 month history of chronic small bowel diarrhoea with no weight loss. No vomiting. Six week history of PU/PD. Recent bloods showed increased ALP and ALT; abdominal U/S - mild hepatomegaly with multifocal target shaped nodules throughout the liver as well as cystic hyperplasia of prostate	CBC, Biochemistry, U/A and culture; abdominal ultrasound; FNA liver and prostate; ACTH stimulation test	Hyperadrenocorticism; suspected IBD	Started 2mg/kg trilostane sid; food elimination trial using z/d. Gained control of hyperadrenocorticism and IBD with treatment. 6 months later developed haematemesis and weight loss. Owner declined further investigation and elected euthanasia
458						
31/08/09	Tumours of the Male Reproductive System	Mack Jackson 8yo Mn Labrador	One month of intermittent haematuria and stranguria. Prostatic wash diagnosed carcinoma	CBC, Biochemistry; thoracic and lumbar spinal radiographs	Prostatic carcinoma	Gemcitabine and carboplatin every 3 weeks x 6; piroxicam 0.3mg/kg sid. Grade 4 neutro[enia and sepsis developed after first treatment and owner declined further treatment. Euthanased September 2009.
459						
01/09/09	Tumours of the Skeletal System	Angus Walker 4yo Mn Great Dane	One week history of non weight-bearing lameness of right hindleg. Radiographs showed large area of moth-eaten lysis distal tibia	CBC, Biochemistry	Open – suspected osteosarcoma	Palliation: pamidronate, carprofen and codeine. Received 5 doses of pamidronate at 3 weekly intervals. Last contact 29/12/09 for more carprofen and codeine
460						
01/09/09	Tumours of the Skin and Subcutaneous Tissues	Spirit Rodgers 7yo Fn Husky cross	Two week history - owner noticed a small amount of blood on the fur near the shoulder. Saw vet and a small skin lesion seen. Suspected dog bite. A few days later developed lots of lesions over the body. Initially pruritic but after biopsy and culture was given single dexamethasone injection and course of doxycycline and within the week the lesions had all but completely cleared.	None	Cutaneous (epitheliotropic) lymphoma	Owner declined further diagnostics and treatment. Lost to follow up
461						
03/09/09	Lymphosarcoma	Rosie Kermode 12yo Fn German Shorthaired Pointer	One month history of enlarging nodes. Node biopsy confirmed lymphoma. Bloods and urine tests unremarkable. Thoracic and abdominal radiographs normal	CBC	Lymphosarcoma, centroblastic B cell; Stage IIIa	UW-19
462						
14/04/10	Lymphosarcoma	Issy Henderson 5yo Fn Labrador	3-4 week history of conjunctivitis, then inappetance and panting. Generalized lymphadenopathy noted; FNA = lymphoma	CBC	Multicentric lymphoma; Stage IIIa or higher	Lomustine every 3 weeks x 6. Owner stopped treatment after first dose due to lack of response. Palliation with prednisolone.
463						
22/04/10	Urinary Bladder Cancer	Lynx Donaldson 7yo Mn DSH cat	One week prior found lying in puddle of urine, then became inappetant and lethargic. Mass in trigone region of bladder noted on ultrasound. Post-renal azotemia due to urethral spasm post catheterization	Ultrasound-guided FNA of bladder mass; CBC, Biochemistry, U/A	Open – likely carcinoma	Piroxicam 0.3mg/kg sid. Lost to follow up
464						
22/04/10	Tumours of the Skin and Subcutaneous Tissue	Milly Rigby 11yo Fn Staffy cross	Rapid growth of mass between digits 4 and 5 right fore foot; excision biopsy = round cell sarcoma, intermediate grade	IHC: toluidine blue, CD3, CD79a, Melan A	Presumed soft tissue sarcoma, intermediate grade	Monitoring only. Lost to follow up
465						
27/04/10	Tumours of the Skin and Subcutaneous Tissue	Lucy Macphail 9yo Fn Staffordshire Bull Terrier	3 month history of squamous cell carcinoma on ventrum, now recurrent	CBC, Biochemistry, U/A	Squamous cell carcinoma x 3; carcinoma in situ	Owner declined treatment. Lost to follow up
466						
29/04/10	Perianal Tumours	Lulu Sloan 13yo Fn cross breed	5 days of licking anus; 2x1.5cm raised black mass noted; FNA = melanoma	CBC, biochemistry; U/A; thoracic radiographs; abdominal ultrasound	Melanoma; T? N0M0	Owner declined further diagnostics or treatment. Lost to follow up
467						

29/04/10 468	Tumours of the Skeletal System	Buffy Lloyd 10yo Fn German Shorthaired Pointer	7 days of limping of left hindleg; radiographs showed lysis and periosteal reaction distal left femur; thoracic radiographs negative for metastatic disease	Jamshidi biopsy	Fibroblastic osteosarcoma	Owner elected amputation and chemotherapy at referring veterinarian. Lost to follow up
29/04/10 469	Tumours of the Intestinal Tract	Barney Carey 11yo Mn Labrador cross	2 weeks of vomiting and inappetance. Abdominal ultrasound demonstrated a 10cm length of thickened SI, up to 10mm diameter. Excision and anastomosis	None	Open – either T cell lymphoma, or granulomatous enteritis	Clinically well so monitoring only via abdominal ultrasound and routine bloods and U/A; ultrasound one month later showed recurrence of disease, therefore presumed lymphoma. Completed LOPP protocol but one month later developed disease recurrence and was euthanased
04/05/10 470	Cancer of the Oral Cavity	Simba Wong 13yo M Lhasa Apso	3-4 week history of halitosis then raised, flashy mass noted over upper left PM1 and 2. Excisional biopsy = undifferentiated sarcoma	IHC (Melan A), CT scan head and thorax; CBC, Biochemistry, U/A; FNA left submandibular lymph node	Melanoma	Segmental maxillectomy; adjuvant carboplatin q3weeks x 6. Recurrence post chemotherapy. Commenced Oncept course, but further disease progression and euthanased after 3 <sup>rd</sup> vaccination
20/05/10 471	Tumours of the Skin and Subcutaneous Tissues	Didi Jones 12yo Fn Blue Heeler cross	One month history of masses over neck; HP = epitheliotropic lymphoma; lesions ranged from epidermal crusts to nodules to ulcerations	IHC (CD3, CD79a)	Epitheliotropic T-cell lymphoma	Owner declined further treatment due to dog's severe DJD and euthanased
25/05/10 472	Cancer of the Oral Cavity	Sophie Tan 12yo Fn Pomeranian	6 week history of right facial swelling. Dental 8 days ago vet noted oral mass surrounding upper premolars. HP = squamous cell carcinoma; right submandibular node moderately enlarged right SMLN, left normal	None	Squamous cell carcinoma	Owner declined further diagnostics and treatment. Lost to follow up
01/06/10 473	Urethral Tumours	Lynk Voitkevich 13yo Fn Heeler cross	Concurrent hyperA. Haematuria and stranguria for 2 weeks. Abdominal US showed bladder trigonal and urethral masses	CBC, Biochemistry, Electrolytes, UA	Transitional Cell Carcinoma (presumptive)	Mitoxantrone q3wks x 6. No improvement after 2 doses; euthanased 15/7/2010
10/06/10 474	Tumours of the skin and Subcutaneous Tissue	Zoe Arbuckle 11yo Fn Labrador	Developed bilateral ocular discharge about 3 weeks prior which is when the lump on her left rump developed. Ref vet also noted 2 firm masses on R and L side of neck. FNA of all 3 masses suggestive of lymphoma.	Biopsy of mass on rump for histopathology and immunohistochemistry; bone marrow aspirate; CBC, Chemistry, UA	Lymphoma	Dog arrested the evening after her diagnostic procedures and died
22/06/10 475	Cancer of the Oral Cavity	Elva Dunne 11yo Fn Rottweiler cross	6 week history of bleeding from the mouth. Referring vet removed mass but owner declined histopathology. Now bleeding has returned.	None	Open – melanoma, SCC, FSA, etc	Owner declined further diagnostics and treatment. Lost to follow up
24/06/10 476	Lymphosarcoma	Oscar McDonald 8yo Mn Beagle	2-3 week history of pregressive inappetance and lethargy. Pyrexia; enlarged prescapular nodes; HP = diffuse intermediate grade lymphocytic lymphoma. CBC – PCV 0.19, PLT 10, Neuts 0.34, Lymphs 33 with atypicals circulating	None	Diffuse intermediate grade lymphocytic lymphoma; Stage Vb	Owner declined further diagnostics and treatment. Lost to follow up
29/06/10 477	Haemangiosarcoma	Ramses Hay 9yo Mn Husky cross	6 week history of inappetance and weight loss. Bloods unremarkable. Abdominal ultrasound found splenic mass. Splenectomy performed – no histopath.	None	Suspected haemangiosarcoma	Owner declined further diagnostics and treatment. Lost to follow up
01/07/10 478	Tumours of the Intestinal Tract	Dax Fowler 8yo M Boxer	2-3 month history of inappetance, vomiting and small intestinal diarrhoea. Endoscopic biopsies diagnosed lymphoma	None	Intestinal Lymphoma	Owner declined further diagnostics and treatment. Lost to follow up
05/07/10 479	Mast Cell Tumours	Jewels Santich 11yo Fn crossbreed	Mass over right antebrachium for 2 months. Excisional biopsy = MCT. Abdominal mass noted at surgery. Exploratory laparotomy removed mass = granulosa cell tumour of ovary.	CBC, Biochemistry, U/A; Abdominal ultrasound	Mast cell tumour; Grade 2 (high grade); Stage 0a	Recurrence March 2011. Minimal response to ongoing medical therapy. Amputation performed but metastatic disease developed soon after. Euthanased.

06/07/10 480	Haemangiosarcoma	Bodhi Willmore 12yo Mn German Shepherd cross	Had episode of lethargy 6 weeks prior to presentation; but then 10d prior developed acute haemabdomen due to splenic mass. Splenectomy confirm HSA; nodules seen on liver but not biopsied	CBC	Splenic haemangiosarcoma; Stage III	VAC protocol and concurrent metronomic chemotherapy as well: CTX 10mg/m2 and piroxicam 0.3mg/kg. Disease recurrence and euthanasia after 17/9/10
06/07/10 481	Tumours of the Endocrine System	Choumi Raynes 12yo Fn shih Tsu	Developed haematuria and on examination vet suspected hyperadrenocorticism. LDDST confirmed this. Abdominal ultrasound found left adrenal mass	CT scan thorax and abdomen	Low grade adrenocortical adenocarcinoma, with direct extension into liver	Surgical excision of adrenal and hepatic masses. Lost to follow up
07/07/10 482	Lymphosarcoma	Cookie Goodridge 9yo F Kelpie	2-3 week history of increased nodes; FNA then biopsy confirmed lymphoma	CBC	Diffuse intermediate grade large cell lymphoma; Stage IIIa or higher	Lomustine every 3 weeks x 8. Partial response achieved but succumbed to her disease December 2010
07/07/10 483	Tumours of the Intestinal Tract	Jack Fleming 12yo Mn DSH cat	Acute onset of vomiting and weight loss. Exploratory laparotomy and multiple intestinal and mesenteric lymph node biopsies taken = diffuse lymphocytic lymphoma	IHC on biopsies (CD3, CD79a); CBC, Biochemistry; Bone marrow aspirate; serum folate and Vitamin B12	Diffuse lymphocytic T-cell lymphoma with mesenteric node involvement	UW-25. Repeat abdominal ultrasound January 2011 confirmed clinical remission. Update Feb 2011 – no concerns.
09/07/10 484	Tumours of the Skin and Subcutaneous Tissues	Fog O'Donovan 12yo Fn Kelpie cross	Owner acquired dog from pound 3 months ago and already had very large mass over caudal right elbow	CBC, Biochemistry, U/A; FNA mass	Soft tissue sarcoma	Metronomic chemotherapy: 10mg/m2 cyclophosphamide, 0.3mg/kg piroxicam daily for life
09/07/10 485	Tumours of the Skeletal System	Winston McGlynn 12yo Mn Ridgeback cross	2 month history of swelling distal right antebrachium. Radiographs show proliferative lesion over distal right radius	None	Open – suspected osteosarcoma	Owner declined further diagnostics and treatment. Palliation with piroxicam 0.3mg/kg sid
13/07/10 486	Mast Cell Tumours	Lester Burt 8yo Mn terrier cross	8 week history of mass over caudal right thigh, slow growth in this time and mildly pruritic. Wide excision performed = mast cell tumour, marginal excision	CBC, Biochemistry, U/A; abdominal ultrasound	Mast cell tumour, grade 2 (high grade) (MI 8/10hpf); T1N0M0	Vinblastine/prednisolone protocol; Recurrence Jan 2011; partial responses to imitinib and toceranib. Developed metatatic disease and euthanased.
13/07/10 487	Urinary Bladder Cancer	Georgie Druzianich 14yo Fn Staffordshire Bull terrier	Stranguria and haematuria for a couple of weeks; abdominal ultrasound demonstrated bladder mass near apex	Thoracic radiographs (3-view); U/S guided FNA of the MILNs; blind cystoscopy-forceps biopsy	Transitional Cell Carcinoma (papillary invasive)	Referred for partial cystectomy; followed by mitoxantrone and piroxicam. Disease recurrence Nov 2010; bone tumour also developed lumbar spine at a similar time – suspected to be a separate primary tumour. Euthanased 19/11/2010
20/07/10 488	Lymphosarcoma	Molly Powell 8yo Fn German shorthaired pointer	5 days history of enlarged peripheral nodes, otherwise well. FNA = probable lymphoma	Lymph node biopsy for histopathology and IHC (CD3, CD79a)	Diffuse intermediate grade large cell lymphoma, B-cell; Stage IIIa or higher	UW-19 protocol. Stopped treatment after 8 treatments due to cost concerns.
20/07/10 489	Mast Cell Tumours	Hugo Reynolds 11yo Mn Labrador	3 month history of mass on ventral chest. Wide excisional biopsy performed = mast cell tumour, complete resection	CBC, Biochemistry, U/A; FNA regional lymph node; thoracic radiographs; abdominal ultrasound	Mast cell tumour, grade 2 (high grade) (MI 18/10hpf); T-1N0M0	Vinblastine/prednisolone protocol
21/07/10 490	Lymphosarcoma	Peter Pyke 12yo Mn wire-haired Fox terrier	12 month history of chronic large bowel diarrhea, responsive to prednisolone. Generalized lymphadenopathy noted 3 days ago.	CBC, Biochemistry, U/A; bone marrow aspirate cytology; node biopsy for histopathology and IHC (CD3, CD79a)	Diffuse intermediate grade lymphocytic lymphoma, B-cell; Stage V	Owner declined chemotherapy; palliation with prednisolone 2mg/kg daily, tapering course
22/07/10 491	Haemangiosarcoma	Indianna Prentice 9yo Fn Staffordshire Bull terrier	5 day history of inappetance then abdominal enlargement. Abdominal mass palpable and seen with ultrasound, presumed splenic. CP2/PT/PTT unremarkable	CBC; 3-view thoracic radiographs; echocardiogram	Open – mass not clearly splenic on repeat abdominal ultrasound	Recommended CT scan to more accurately characterize mass prior to surgery. Owner declined further diagnostics and treatment. Euthanased 22/07/2010
22/07/10 492	Mast Cell Tumours	Bailey Platt 2yo Mn Groodle	2 week history of 1cm mass over right thorax. FNA = MCT; wide excision for histopathology: grade 1 MCT, complete excision	CBC; FNA right axillary lymph node; abdominal ultrasound	Mast cell tumour, grade 1 (MI <2/hpf)	No further treatment required

29/07/10 493	Tumours of the Intestinal Tract	Nero Richmond 2yo Mn Beagle cross	2 week history of lethargy and inappetence. Abdominal mass detected. Ultrasound-guided FNA of mass and enlarged mesenteric nodes suggestive of lymphoma. Circulating atypical mononuclear cells on peripheral blood smear	Bone marrow aspirate and CBC	Lymphoma; Stage V	Owner declined further treatment. Euthanased 29/07/10
29/07/10 494	Lymphosarcoma	Tahlee Thompson 10yo Fn Border Collie	One month history of PU/PD and enlarged peripheral lymph nodes. FNA of nodes = lymphoma	CBC, Biochemistry, U/A, iCa	Lymphoma; Stage IIIa or higher	Doxorubicin every 3 weeks x 6. Still in clinical remission 8/3/2011
5/8/10 495	Cancer of the Nasal Planum	Hammer Appicchato 10yo Fn DSH cat	Seen 18 months prior for non healing lesion right dorsal nasal planum, presumed SCC, treated with cryosurgery. Now similar lesion left side nasal planum	None	Squamous Cell Carcinoma (presumptive)	Cryosurgery. Recurrence after 4 months therefore nosetomy performed. 'Dirty' left lateral margins and disease recurrence within 3 months. Last seen September 2011
5/8/10 496	Lymphosarcoma	Miffy Crowley 11yo Fn Shih Tsu cross	1-2 week history of enlarged nodes; FNA = probable lymphoma	None	Probable multicentric lymphoma; Stage IVa or higher	Owner declined further diagnostics and treatment. Lost to follow up
10/8/10 497	Mast Cell Tumours	Roly Norton 13yo Mn Labradoodle	4-5 day history of enlarged left inguinal node and marked associated inflammation; FNA inconclusive	Abdominal ultrasound and fine needle aspirate cytology left inguinal node	Inconclusive	None. No further recurrence of inflammation of inguinal node; likely cellulitis of unknown inciting cause
19/8/10 498	Thymoma	Dante Lovelock 17yo Mn Burmese cat	Routine geriatric check-up and spinal radiographs to assess DJD detected cranial mediastinal mass	3-view thoracic radiographs; ultrasound cranial mediastinum and abdomen; FNA cranial mediastinal mass and spleen	Thymoma	Owner declined further diagnostics and treatment. Lost to follow up
19/8/10 499	Tumours of the Endocrine System	George Mitchell 5yo Mn Labrador cross	Mass left ventral neck for 2-3 months; 3cm diameter, mobile; incisional biopsy = thyroid follicular carcinoma	CBC, Biochemistry, U/A; TT4/TSH; CT scan neck and thorax	Follicular Thyroid Carcinoma	Complete surgical excision
26/8/10 500	Lymphosarcoma	Rex Perris 5yo M Golden retriever	One week history of enlarged nodes. Incisional biopsy = Diffuse large cell B-cell lymphoma	CBC, Biochemistry, U/A; bone marrow aspirate	Diffuse large cell B-cell lymphoma; Stage Va	UW-19 with 5 day cytarabine infusion. Euthanased 17/8/11 due to disease recurrence and progression

## **Glossary of Abbreviations:**

ALL – Acute lymphoblastic leukaemia

ALT – Alanine aminotransaminase

ALP – Alkaline phosphatase

CBC – Complete Blood Count

CT- Computed tomography

FNA – Fine needle aspirate

IHC – Immunohistochemistry

M/C/S – Microscopy/Culture/Sensitivity

MCT – Mast cell tumour

PT/PTT – Prothrombin time/partial thromboplastin time

PU/PD – Polyuria, polydipsia

U/A – Urinalysis

UPCR – Urine protein: creatinine ratio

HDC-BMT – High Dose Cyclophosphamide, Bone Marrow Transplant chemotherapy protocol

UW-19 – University of Wisconsin-Madison canine 19 week chemotherapy protocol

UW-25 - University of Wisconsin-Madison feline 25 week chemotherapy protocol

VAC – Vincristine, Adriamycin, Cyclophosphamide chemotherapy protocol



Cases were classified according to the suspected disease for which they were referred to Perth Veterinary Oncology. Further diagnostics may have later confirmed that the suspected disease was incorrect. However, the breakdown of these cases classified according to suspected or confirmed tumour type is as follows (from most to least frequent):

1. Lymphosarcoma:	121 (24.2%)
2. Mast Cell Tumours:	82 (16.4%)
3. Soft Tissue Sarcomas:	47 (9.4%)
4. Tumours of the Skeletal System:	43 (8.6%)
5. Tumours of Skin & Subcutaneous Tissues:	35 (7%)
6. Haemangiosarcoma:	25 (5%)
7. Cancer of the Oral Cavity:	24 (4.8%)
8. Tumours of the Intestinal Tract:	14 (2.8%)
9. Tumours of the Endocrine System:	13 (2.6%)
10. Hepatic Tumours:	12 (2.4%)
11. Perianal Tumours:	11 (2.2%)

12. Cancer of the Nasal Planum: 11 (2.2%)
13. Tumours of the Mammary Gland: 9 (1.8%)
14. Tumours of Male Reproductive System: 7 (1.4%)
15. Urinary Bladder Cancer: 7 (1.4%)
16. Nasal Tumours: 7 (1.4%)
17. Histiocytic sarcoma: 6 (1.2%)
18. Ocular Tumours: 5 (1%)
19. Leukaemias & Myeloproliferative Disorders: 4 (0.8%)
20. Lung Cancer: 4 (0.8%)
21. Plasma Cell Neoplasms: 3 (0.6%)
22. Cancer of the Salivary Glands: 3 (0.6%)
23. Renal Cancer: 3 (0.6%)
24. Urethral Tumours: 2 (0.4%)
25. Thymoma: 1 (0.2%)

26. Mesothelioma:	1 (0.2%)
27. Neoplasia of the Heart:	0
28. Oesophageal Cancer:	0
29. Exocrine Pancreas Cancer:	0
30. Gastric Cancer:	0
31. Cancer of the Larynx and Trachea:	0
32. Cancer of the Ureter:	0
33. Tumours of Female Reproductive System:	0
34. Tumours of the Nervous System:	0
35. Transmissible Venereal Tumour:	0

There were 58 feline cases (11.6%) and 442 canine cases (88.4%). Of the canine cases, there were 150 dogs listed as a crossed breed. The ten most common pure breeds seen were as follows:

1. Labrador: 27 (6.1%)
2. Golden retriever: 26 (5.9%)

3. Staffordshire bull terrier: 26 (5.9%)
4. Rottweiler: 23 (5.2%)
5. Boxer: 19 (4.3%)
6. Jack Russell terrier: 14 (3.2%)
7. German shepherd dog: 13 (2.9%)
8. Cocker spaniel: 12 (2.7%)
9. Border Collier: 11 (2.5%)
10. Beagle: 9 (2%)

Although some of these breeds have been reported in previous studies to be at a higher risk of developing various tumours, without a comparison to the general hospital population and the canine population of the wider state of Western Australia, it cannot be confirmed whether the above breeds are more susceptible to cancer, or are currently the more popular breeds.

## **PART ONE**

## **PART TWO**

Patient and tumour characteristics for osteosarcoma in dogs in Western Australia have not previously been described and we currently extrapolate information published by American or European institutions onto our patients. However, we know that this doesn't hold true for some diseases. This first part of this section provides a brief description of the cases from Section One classified as 'Tumours of the Skeletal System', which included all cases with bony lesions suggestive of skeletal neoplasia. Dogs with a confirmed diagnosis of osteosarcoma, in addition to cases seen at Perth Veterinary Oncology prior to and following the period of case log accrual, are then described in more detail. The patient signalment and disease presentation are compared and contrasted to previous studies to determine whether osteosarcoma in our cohort of dogs is a similar entity.

## **2.1 All bone lesions**

This section is a description of cases classified as 'Tumours of the Skeletal System' in the activity log included as Section One of this document, which included all cases that were referred to Perth Veterinary Oncology with bony lesions suggestive of skeletal neoplasia.

Tumours of the skeletal system comprised 43 of the 500 cases seen during this time period. This is a prevalence of 8.6% of cases. Of these, 20 had a histopathologically confirmed diagnosis of osteosarcoma. There were two poorly differentiated sarcomas, and one each of multilobular osteochondrosarcoma, maxillary fibrosarcoma and extramedullary osteosarcoma. There were two non-neoplastic lesions. Sixteen cases did not have the diagnosis definitively confirmed.

## **Diagnosis**

The initial diagnosis was confirmed in 26 cases using either a Jamshidi biopsy or post amputation of the affected limb. One dog had a sarcoma diagnosed on fine needle aspirate cytology of a lesion in the distal radius that then proceeded to limb amputation, which confirmed the diagnosis of OSA. Sixteen dogs did not have further diagnostics performed to confirm the underlying disease.

## **Staging**

Further staging of the disease was performed using the following diagnostic tests: complete blood count (n=18), serum biochemistry (n=18), urinalysis (n=13), 3-view thoracic radiographs (n=16), fine needle aspirate cytology of the regional lymph node (n=12), abdominal ultrasound (n=3), computed tomography of the head and thorax (n=3), thorax only (n=2) or head thorax and abdomen (n=1). Metastatic disease was detected in only two patients, both as pulmonary metastases.



## **2.2 Osteosarcoma cases only**

For dogs with OSA, various patient characteristics are reported to occur more commonly. Some of these characteristics may have been reported in early studies and with time become 'dogma' with no further scientific evidence. The following section aims to describe the patient characteristics of the dogs from the case log included in Part One of this thesis with a histopathological confirmation of OSA (n=20), plus the inclusion of additional patients presented to Perth Veterinary Oncology who have also had a definitive diagnosis of OSA (n=30) giving a total of 50 dogs to analyze. Of these, 45 cases had appendicular OSA and 5 cases were axial OSA. This will then be compared and contrasted with collated results of previously published studies. In each section, the results from published reports on appendicular osteosarcoma will be collated, followed by comparison with any information available for axial tumours and extraskeletal osteosarcomas.

### **Age**

For the cases with appendicular OSA:

Median = 8 years

Mean = 8.67 years

Mode = 7 years

Range = 4-16 years

Age is variably reported as a mean or median value, often followed by the range.

Five studies of dogs with appendicular osteosarcoma reported age as a mean value.<sup>5,18-19,26,32</sup> Taking a further average of these values gives a final mean age of 8.08 years (range 11 months – 15.9 years). Similarly, 12 studies reported age as a

median value.<sup>1-3,7,9,15-16,20,22-23,28-29</sup> The median value of these patient ages is 8 years (range 8 months – 16 years). Our results are comparable with these.

OSA has been reported to develop most commonly in middle-aged and slightly older dogs (mean 7.7yrs), with a second earlier age peak in dogs <3 years old.<sup>8</sup> This early statement is supported by the data above confirming middle aged and slightly older dogs to be more commonly affected, but although the stated age ranges show young dogs may be affected, no other studies have suggested a distinct earlier age peak. More recent studies have confirmed a slightly earlier onset of disease when compared with other neoplasia. One study found there was a pronounced peak in the 6- to 10-year age group with the mode at 8 to 9 years of age, followed by a sharp decline thereafter<sup>10</sup>. Similarly, another study reported that 65% of dogs that developed OSA were aged between 7-10 years<sup>25</sup>. Whether the decrease in incidence in older dogs is due to the shorter lifespan of the more commonly affected large breed dogs has not been confirmed. Our results are again comparable to these numbers with a peak at 7-8 years of age.

Four studies assessing axial osteosarcoma also reported age as median or mean values.<sup>11,13-14,30</sup> The median values were both 9 years (range 2-14 years). The mean values were 8.7 and 9.5 years (range 3-15 years). Of the 5 dogs included in our results, four of the five were 9 years or older. This may indicate that axial osteosarcoma affects slightly older dogs, but may also simply be due to a smaller total number of dogs to be assessed. OSA of the rib is reported to occur in younger dogs with a mean age of 4.5-5.4 years.<sup>12,14</sup> The three dogs in our group with rib OSA were 8, 11 and 11 years of age, which differs to this hypothesis but it is difficult to make comparisons with the small number of dogs in our group.

## **Gender**

For the cases with appendicular OSA there were 24 females (1 entire, 23 desexed) and 21 males (5 entire, 16 desexed).

Appendicular OSA is reported to occur 1.1-2.0x more frequently in males than in females<sup>8,20,28</sup> whereas axial OSA is seen twice as often in females than males<sup>13</sup>.

Analysis of 22 studies involving dogs with appendicular osteosarcoma<sup>1-5,7,9,15-20,22-24,26-29,31-32</sup> showed that there were 900 male dogs affected and 892 female dogs affected, giving a male to female ratio of 1:0.99. This demonstrates that male and female dogs appear to be equally at risk for the development of canine appendicular osteosarcoma. In our group of dogs, there were 21 males and 24 females with appendicular OSA, giving a male to female ratio of 1:14, consistent with this theory. One study has shown histological tumour grade (which was associated with OST) was not associated with gender<sup>18</sup>. Most studies involving dogs with osteosarcoma assess gender as a patient and tumour related variable but no studies have found gender to be significantly associated with disease free interval or overall survival time.

In three studies involving dogs with non-appendicular osteosarcoma that had gender recorded<sup>11-12,30</sup>, there were 53 male dogs and 65 female dogs affected, giving a male to female ratio of 1:1.23. Of the 5 patients with axial OSA in our cohort, 4 were female (neutered) and 1 was male. It may appear that for axial OSA, females may be over-represented. There is no plausible explanation for this and a larger group of dogs should be assessed to confirm this finding.

In comparison, a study of 1702 human patients with osteosarcoma of the extremities or trunk recorded 59.2% males and 40.2% females, giving a male to female ratio of 1:0.68, which shows a slightly higher male predominance. In that study, the female sex was associated with a higher likelihood of a good response to treatment but this did not translate into a survival advantage.<sup>6</sup>

### **Breed**

Of the 45 cases with appendicular OSA, breeds represented included Rottweiler (n=16) or their crosses (n=2), Labrador (n=3) or their crosses (n=2), Rhodesian ridgeback (n=1) or their crosses (n=3), Australian Cattle dog (n=2) or their crosses (n=1), Golden retriever (n=2) and one each of Border Collie, German Shorthaired pointer, Christmas Island terrier, Rough Coated Collie, Bernese Mountain dog, Kelpie, Kelpie cross, Bull Mastiff cross, Great Dane cross, Greyhound cross, terrier cross, Staffordshire Bull terrier cross and a German Shepherd cross.

From 13 research papers describing canine appendicular OSA<sup>1,3,7,9,15,19-20,22-24,26-28</sup> excluding mixed breeds, Rottweilers were the most common breed affected in eight papers, followed by Labrador retrievers in three papers, and golden retrievers and Dobermans in one paper each. Alternatively, if the three most common breeds in each paper are counted, the most commonly affected breeds were: Rottweiler (n=9), Labrador retriever (n=8), golden retriever (n=8), greyhound (n=5), Great Dane (n=3), German shepherd (n=2) and the Doberman, Irish setter and Irish wolfhound were listed once each. Our results are similar to these with Rottweilers again being listed as the most commonly affected breed. A comparison of affected breeds to the general hospital population is rarely performed, so it cannot be stated definitively that Rottweilers are commonly

affected simply due to their popularity. However, given the large number of research papers from various parts of the world finding this breed to be most affected, it may be that there is a heritable component to the tumour, which is carried along this breed's line. No further research has been performed to determine this genetic abnormality.

In studies describing axial OSA<sup>11,13-14,30</sup>, golden retrievers, Labradors and German shepherd dogs were the three most commonly affected breeds, similar to above. However, the Rottweiler was listed infrequently. This may suggest that the aetiology of OSA affecting Rottweilers may be a different disease to that affecting other breeds, or simply reflect the relatively small numbers of axial OSA cases reported in the veterinary literature. Our five cases having axial OSA were a Rottweiler, Rottweiler cross, Labrador, Whippet and Cocker spaniel.

### **Bodyweight**

For the cases with appendicular OSA:

Mean = 34.22kg

Median = 34.5kg

Range = 14.5 - 62kg

Bodyweight is variably reported as a mean or median value, often followed by the range. Six studies of dogs with appendicular OSA reported bodyweight as a mean value.<sup>5,17,19,22,26,32</sup> Taking a further average of these values gives a final mean bodyweight of 40.9kg (range 9-73kg). Similarly, 8 studies reported bodyweight as a median value.<sup>1-3,15-16,20,23,28</sup> The median value of these patient bodyweights is 36kg (range 8.2-107kg).

Four studies assessing axial osteosarcoma<sup>11,13-14,30</sup> reported mean bodyweights of 27.8kg and 28.2kg (range 4.3-54.4kg) in two papers and median bodyweights of 29kg and 30kg (range 4-55kg) in the two others. One of these studies reported that axial OSA affects medium to large breed dogs<sup>14</sup>, differing from appendicular OSA, which tends to affect large or giant breed dogs.<sup>8,21,29</sup> The average bodyweight of 40.9kg calculated above for dogs with appendicular OSA is much higher than the average bodyweight of axial OSA from two studies, being 28kg, which supports this hypothesis.

### **Tumour Location**

Of the 45 appendicular OSA lesions, there were 20 affecting the foreleg and 25 affecting the hind leg. There were 24 affecting the right side and 21 affecting the left side. There were 15 lesions in the femur: 12 distal, 2 proximal and one mid-femur; 10 proximal and 2 distal humeral lesions; 7 distal and 3 proximal tibial lesions; 6 distal and one mid radial lesions; and one scapula lesion.

Tumour location is most commonly recorded in research papers as an exact anatomical location. Some papers record only the bone involved but not whether the lesion is proximal or distal. Some papers list the most frequently affected sites but not the locations where only small numbers occurred (grouped together as 'others'). Rarely, only the number of lesions involving the forelimb versus the hindlimb is noted.

From 15 research papers where the number of forelimb versus hindlimb lesions could be calculated <sup>1-5,9,15,19-20,23,26-29,31</sup>, there were 783 OSA lesions affecting the forelimb and 420 lesions affecting the hind limb. This provides a forelimb to hindlimb ratio of 1.86:1, or that forelimb tumours account for 65% of primary appendicular OSA. This is consistent with a previous report stating that forelimb lesions occurred in 60% of cases.<sup>21</sup> Our results differ from this with 45% of tumours affecting the forelimb and 55% affecting the hindlimb. There is no rational explanation as to why this may be and is likely related to the relatively small numbers assessed.

From 10 research papers where the exact location of the tumour was recorded<sup>1-4,15,19-20,27,29,31</sup>, there were (in descending order of frequency):

- 215 lesions in the distal radius
- 193 lesions in the proximal humerus
- 95 lesions in the distal femur
- 63 lesions in the distal tibia
- 53 lesions in the proximal tibia
- 19 lesions in the proximal femur
- 18 lesions in the distal ulna
- 12 lesions in the distal humerus
- 12 lesions in the scapula
- 3 lesions in the proximal radius
- 1 lesion in the proximal ulna

From this data, distal radial lesions comprise 31% and proximal humeral lesions comprise 28% of all canine appendicular OSA lesions. This supports the often-quoted description that canine OSA occur 'away from the elbow, and close to the knee'.

Similarly, from our data of 45 appendicular lesions the distal femur and proximal humerus were the most common locations for primary OSA tumours to be diagnosed.

Tumour locations recorded for axial OSA tumours in three studies<sup>11,13-14</sup> were (in descending order of frequency):

- 46 lesions in the mandible
- 37 lesions in the maxilla
- 27 lesions in the spine
- 23 lesions in the cranium



- 19 lesions in the rib
- 13 lesions in the nasal cavity/paranasal sinuses
- 11 lesions in the pelvis
- 1 lesion in the sternum

Our patients had a slightly different frequency of occurrence, with rib lesions being the most frequent (3/5 cases). It is possible referring veterinarians may feel more capable treating tumours of the mandible with surgical excision, thereby causing a bias to our cases.

## **Conclusion**

The population of dogs definitively diagnosed with OSA at Perth Veterinary Oncology is similar to that published by institutions elsewhere. The result of collaboration of signalment findings in previous research papers allows us to conclude that appendicular OSA affects middle-aged to older dogs most commonly, and that axial OSA tends to affect slightly older dogs; that males and females are affected with appendicular OSA with equal frequency, although axial OSA may tend to affect females more commonly; Rottweilers and Labradors are the breeds most commonly affected by appendicular OSA suggesting a genetic component to the disease, and that Labradors and Golden retrievers are most commonly affected by axial OSA, but not Rottweilers; and that appendicular OSA favours the forelimb more frequently than the hindlimb, with the distal femur and proximal humerus being the most commonly affected locations, and that the mandible, maxilla and spine are the three most commonly affected locations for axial OSA.

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## **PART THREE**



This section discusses risk and prognostic factors for the development of osteosarcoma that have been reported and includes a literature review demonstrating or refuting the evidence for these factors.

Canine osteosarcoma is an aggressive cancer that is ultimately fatal in the majority of patients affected. The current treatment recommendations include treatment of the primary tumour by surgery (limb amputation, limb-sparing surgery or local excision for non-appendicular lesions where possible) or radiation therapy (stereotactic radiotherapy), followed by treatment of micrometastases, present in at least 90% of patients, with adjuvant chemotherapy. These treatments may lead to patient discomfort or morbidity in the short or long term, and at the worst extreme, death. The costs for these treatments are also significant and may influence an owner's decision. Therefore, for owners to make the decision to proceed with treatment, being able to provide an accurate prognosis for that particular patient is imperative.

Various factors have been identified in studies published in peer-reviewed journals that may indicate a more or less favorable prognosis. These factors will be described, and the evidence supporting or refuting their benefit will be discussed. Emphasis will be on canine osteosarcoma of the appendicular skeleton as 75% of canine osteosarcomas develop in long bones, compared to 25% arising in the skull and axial skeleton. (Brodey and Riser, 1969). This information will be compared to results published in the human literature, particularly from the largest retrospective study and a recent systematic review of human patients with osteosarcoma. (Bielack et al, 2002; Pakos et al, 2009)

The factors are listed in order of signalment, presentation, staging results and histopathological variables.

Abbreviations:

OSA osteosarcoma

DFI disease free interval

OST overall survival time

## Age

Studies have conflicting results when determining whether young or old age carries a poorer prognosis, or whether age is prognostic at all.

Advancing age was a predictor of poor survival in the study by Moore et al (2007).

These authors hypothesized that chemotherapy may be more effective against micrometastatic disease in younger animals, or that younger animals had less histologically aggressive tumours. Age was significant in all multivariate analyses, except when mitotic rate was added into the analysis. There was no explanation as to why this variable may affect the significance of age, but it is most likely due to study design. Phillips et al (2009) reported that following multivariate analysis, age > 5 years maintained negative prognostic significance, with a risk ratio of 2.1.

Spodnick et al (1992) found that prognosis appeared to be most favorable in middle-aged dogs (7-10yrs), and was poorer among younger and older dogs. The poorer prognosis in older dogs was explained by their tendency to be more quickly and severely debilitated by the effects of advanced metastatic disease than are younger dogs. The poorer prognosis in younger dogs was more difficult to explain, but has been documented in humans. (Taylor, 1989; Bentzen, 1988) Sottnik et al (2010) confirmed with multivariate modeling that younger dogs (<8 years) had a shorter DFI compared with older dogs.

Age was not a significant prognosticator in two studies by Kent et al (2004) and Bailey et al (2003), although both these studies may have lacked the power to detect a

significance due to the small number of dogs included in the analysis (32 and 24 dogs, respectively).

In humans, the median age at diagnosis is 15 years (range 2-68 years). Patients over 40 years of age are more likely to present with axial tumours, secondary osteosarcomas, have a prolonged history of symptoms, and have a delayed start of treatment. (Bielack, 2002) Age was not significant on multivariate analysis of prognostic factors in the retrospective study by Bielack et al (2002). However, in the review by Pakos et al (2009), age less than 14 years was a consistent independent negative prognostic factor. Bielack et al (2002) suggest that the impression that older patients do worse may be attributable to the increased proportion of unfavorable axial lesions with increasing age.

From these results, it is difficult to conclude that age may be useful as a prognostic factor in dogs with appendicular OSA. Loukopoulos et al (2007) reported that young animals differed from old animals in having OSA of a higher grade, score and mitotic index. Dogs aged  $\leq 4$  yrs had a significantly higher tumour grade than  $>4$  yrs. Therefore, if left untreated may result in a shorter survival time for younger dogs. However, these dogs may have a better response and survival time if treated with cytotoxic chemotherapy that is more effective when cancer cells are aggressive and more rapidly dividing.

## **Bodyweight**

Increasing bodyweight has predicted shorter survival in several studies of dogs with appendicular OSA. (Bergman et al, 1996, Lascelles et al, 2005, Moore et al, 2007)

Similarly, bodyweight >40kg was associated with a shorter DFI and OST. (Ru et al, 1998)

Bergman et al (1996) hypothesized that chemotherapy dosing by body surface area allows for higher dosing to smaller dogs and therefore a higher percentage of tumour cell kill. For this reason, Moore et al (2007) argues for increasing chemotherapy dosage in patients that do not show toxicity at starting dosages. Another possibility suggested by Lascelles et al (2005) was that larger dogs may be more difficult to nurse and euthanasia is opted for earlier.

Large breed dogs tend to have an overall shorter life span, irrespective of the presence of disease, meaning they are at a higher geriatric level compared to smaller dogs when diagnosed with cancer, which may contribute to their earlier demise. (i.e. a 7-year-old Great Dane that weighs 80kg is 'biologically' older than a 7-year-old Kelpie that weighs 20kg).

Rosenberger et al (2007) found bodyweight to not be a risk factor for OSA; however, these authors were only comparing the 3 breeds with the highest prevalence in their study which were all large breed dogs (Greyhound, Rottweiler and Great Dane) and therefore all of a heavier bodyweight, with no comparison to smaller breeds of lighter bodyweight. Bodyweight was also not a significant prognosticator in the study by

Bailey et al (2003), but again, this study only included 24 dogs and may have lacked statistical power.

Overall, it appears there is consensus that a higher bodyweight is associated with an increased risk of developing appendicular OSA in dogs.

## **Breed**

Most research papers do not compare the frequency of breeds affected by OSA with the most frequent breeds within the general hospital population to determine if there is a true genetic predisposition.

In 1974, Cohen et al published data from the University of Pennsylvania School of Veterinary Medicine, which highlighted the Boxer as having the highest relative risk for developing OSA (and other neoplasms) compared to other breeds. The Boxer has only been listed as a commonly affected breed in one other early study (Misdorp and Hart, 1979). The lack of more recent studies noting the Boxer to be at increased risk may be due to geographical differences, or due to the breed becoming less popular, or to evolving genetic changes (intentionally or inadvertently not breeding from genetic lines which have developed OSA).

Ru et al (1998) postulated that commonly affected breeds may not simply be affected due to their large bodyweight, as suggested by Tjalma (1996), but rather a genetic susceptibility to OSA for individual breeds might be possible. They found that among breeds of similar body size, the risk of OSA showed a wide range. A report of OSA affecting first generation Saint Bernards suggests a familial genetic component. (Bech-Nielsen et al, 1978)

There is currently no evidence that the disease in different breeds has a different aetiology or clinical outcome. For three of the most commonly affected breeds (Rottweiler, Greyhound and Great Dane) Rosenberger (2007) confirmed that the location of the tumours in their cases was similar to other reports, being the proximal

humerus and distal radius. All studies that have included breed in their statistical analysis reported that there is no correlation between breed and DFI or OST, allowing the conclusion that while certain breeds may be at increased risk for the development of appendicular OSA, their breed does not influence their outcome.



### **Prolonged duration of clinical signs before surgery**

Two papers have found a significant correlation between the length of time of demonstrable clinical signs prior to presentation and outcome, although the results were conflicting.

Brodey and Abt (1976) showed that the duration of clinical signs was longer in dogs that did not develop metastatic disease, compared with dogs that did develop metastases.

In contrast, Bailey et al (2003) reported the median duration of clinical signs for patients that developed progressive disease was 30 days (range 9–180 days), and the median duration for patients that did not develop progressive disease was 21 days (range 7-30 days). Patients with a longer duration of clinical signs were more likely to develop progressive disease ( $p = 0.02$ ). These authors did not propose reasoning for this finding.

A lower grade disease could explain a prolonged history of symptoms with a better outcome. Alternatively, it is possible that the longer the disease is present prior to treatment a larger burden of micrometastases may develop, leading to an overall increased tumour burden.

Saam et al (2011) did not find an association between duration of lameness prior to surgical removal of the tumour and OST.

### **Tumour location**

Again, there is a discrepancy between research papers as to whether the location of the primary tumour is important prognostically.

The proximal humeral location has been reported to be a negative prognostic indicator by several authors. Bergman et al (1996) reported that their nine dogs with proximal humeral OSA had an increased hazard ratio (HR 4.72) compared with dogs with OSA in other sites, and that proximal humeral OSA was a significant negative survival prognostic factor on multivariate analysis. Both Mehl et al (2005) and McMahon et al (2011) reported that of all prognostic factors evaluated, only the proximal humeral location was associated with a significantly shorter DFI. Phillips et al (2009) also confirmed the proximal humeral location as having a negative prognostic significance following multivariate analysis (with a risk ratio 1.6). Sottnik et al (2010) reported that dogs with primary tumours of the humerus had a significantly reduced DFI compared with dogs with primary tumours in other appendicular locations, and multivariate modeling of all variables determined that primary tumour location was significantly related to DFI. These latter four papers included 105, 50, 155 and 69 dogs, respectively, and therefore had sufficient power to detect significance.

Conversely, tumour location as a positive prognostic factor has been suggested for the distal radial location. McNeill et al (2007) reported that OST was longest for tumours affecting the radius (392 days) and shortest for tumours affecting the humerus (201 days) but this was not statistically significant ( $p=0.45$ ). Bacon et al (2008) supported this finding with their results showing that of the 50 dogs in their study, those with radial tumours had a significantly longer DFI and OST than other locations. Saam et al

(2011) found dogs with OSA in the distal radius had a numerically superior MST relative to dogs with OSA in the proximal humerus, but this was not statistically significant in their study of 65 dogs.

In humans, patients with distally located tumours (i.e. below the elbow or knee) have a better prognosis than do patients with proximally located tumours (Taylor et al, 1978; Taylor et al, 1985).

Bielack et al (2002) reported that in humans, 87.7% of extremity tumours were located in the leg and 12.3% in the arm. Tumours involving the knee (distal femur, proximal tibia or fibula) made up 75.7% of limb tumours and 71% of all OSA. The prognostic preference of the distal location was supported with the tibia being a prognostically favourable site and the humerus being an unfavourable site. A previous observation that the earlier growth spurt of the humerus was associated with an earlier development of OSA at this site was not observed.

The reason for primary appendicular OSA of the proximal humeral location as being a negative prognostic factor is unknown. The above authors hypothesized that this site may allow for more advanced local growth (contributing to a larger tumour volume) before diagnosis which leads to an increased risk for the development of metastases. Larger tumour size as an independent risk factor for OSA is discussed below.

Comparison of the radiographic or scintigraphic volume of radial tumours versus tumours of other sites was suggested as being potentially useful to help investigate this further. Interestingly, Spodnick et al (1992) could not demonstrate a significant association between primary tumour site and DFI or OST in their study of 162 dogs treated with amputation alone. It is possible that tumours of the distal radius only gain a

positive prognostic significance once treated with adjuvant chemotherapy. Loukopoulos and Robinson (2007) reported that tumour grade was significantly higher in distal OSA compared with proximal OSA, and, as stated above, the higher grade of the tumour with more actively dividing cells may be killed more effectively by cytotoxic drugs.

With respect to the prognostic importance of tumour location for axial OSA, Hammer et al (1995) reported that tumours arising from the scapula or ribs were associated with the highest prevalence of metastatic disease. Loukopoulos and Robinson (2007) described rib OSA to have a degree of necrosis significantly higher than that at most other sites, which supports a more aggressive disease.

### **Serum ALP concentration**

Ehrhart et al (1998) reported that a preoperative total alkaline phosphatase (TALP) concentration above 110U/L was associated with a shorter survival (median OST 177 days versus 495 days if less than 100U/L). Preoperative bone-specific ALP (BALP) concentration less than 23U/L had a significantly longer OST (546 days versus 218 days). Increased BALP activity after surgery was significantly associated with a shorter survival interval. The type of surgery (amputation versus limb-spare) did not influence this finding. These authors proposed that dogs with increased TALP and BALP might have larger tumour burdens and therefore, have shorter survival times than dogs with lower tumour burdens. However, percentage of bone length involved, a rough indicator of tumour volume, was not correlated with preoperative concentration of TALP or BALP or associated with OST or DFI. The authors also postulated that a tumour in which cells are poorly differentiated might be associated with higher preoperative activities of TALP and BALP, but this was not the case in their study.

Garzotto et al (2000) reported similar results in their study of 61 dogs with appendicular OSA treated with amputation and adjuvant chemotherapy. In this study TALP, as well as bone (BALP), liver (LALP) and corticosteroid-induced (CALP) isoenzymes were measured. Preoperative TALP and LALP concentrations were significantly associated with survival. Median survival times for dogs with normal or increased preoperative TALP concentrations were 12.5 and 5.5 months, respectively. The clinical relevance of the increased LALP could not be fully explained; however, the authors hypothesized that neoplastic osteoblasts may produce LALP or a LALP-like substance. Alternatively, if the glycosylation of BALP was abnormal, the assay may have incorrectly recorded BALP as LALP due to their structural similarity. In this study, all isoenzymes decreased

significantly after treatment and there was no significant correlation between post-treatment concentration of TALP or any isoenzyme and survival.

Kirpensteijn et al (2002) reported that serum ALP concentration was one of only two independent prognosticators in their study, although the bone-specific isoenzyme was not analysed. Fifteen of 49 dogs (30.6%) had an increased TALP concentration. An increased level of ALP was associated with a shorter DFI and ST. Dogs with a normal ALP value benefited from chemotherapy, compared with dogs with an increased ALP who did not benefit from adjuvant chemotherapy. Increased ALP values were not associated with tumours of a higher grade.

Vail et al (2002) reported that 16 of the 38 (42%) dogs included in their study had an ALP concentration above the reference range. This was the only variable analysed that was of prognostic significance. The DFI for dogs with normal TALP versus increased TALP at the time of diagnosis were 485 and 128 days, respectively, and the OST were 459 and 207 days, respectively.

Hillers et al, (2005) reported that 90 out of 214 dogs (42%) had an ALP concentration above the reference range. Median DFI for dogs with an increased preoperative serum ALP activity (160 days) was significantly ( $P = 0.025$ ) shorter than median DFI for dogs with normal preoperative serum ALP activity (238 days). An increased serum ALP activity was not significantly associated with evidence of regional lymph node metastasis.

Moore et al (2007) found TALP was increased in 92 out of 293 (30%) at presentation. BALP was increased in 72 out of 240 (24%) at presentation.

Increased TALP and BALP significantly affected survival on univariate analysis. These authors concluded that increased serum ALP activity at presentation was strongly predictive of poor survival. In addition, high serum BALP activity was an even stronger predictor of low long-term survival.

Phillips et al (2009) and Selvarajah et al (2009) supported these findings in their analyses, with an elevated ALP being associated with a negative prognostic significance on multivariate analysis.

Conversely, Kent et al (2004) and Chun et al (2005) reported in their studies of 32 and 35 dogs, respectively, that ALP activity greater than the reference range was not prognostic for overall survival. McMahon et al (2011) also reported in their study that the eight out of 50 dogs (16%) that had an elevated preoperative TALP did not have a significantly different DFI to dogs that had TALP concentration within the reference range at presentation. These results may have been due to the relatively smaller number of dogs included these studies and overall it would appear that an increased TALP at presentation can be considered as a negative prognostic factor.

Similarly, a high ALP concentration was also considered to be a factor that was independently predictive of a poorer outcome in the review of human OSA by Pakos et al (2009).

### **Blood monocyte and lymphocyte count**

Sottnick et al (2010) reported that pretreatment values of blood monocytes and lymphocytes might be prognostic for dogs with appendicular OSA. Dogs with a monocyte count greater than  $0.4 \times 10^3$  cells/ $\mu$ L and lymphocyte count greater than  $1 \times 10^3$  cells/ $\mu$ L had a significantly shorter DFI. The author's explanation for the increased monocyte count being associated with a poorer prognosis was that the monocytes being counted on a routine CBC might actually be myeloid-derived suppressor cells, which suppress anti-tumour immune responses. The finding that dogs with lymphopenia had a significantly longer DFI could not be definitively explained, but the authors hypothesize that lymphocytes may be redistributed from the circulation into tumour tissues in dogs with OSA micrometastases.



### **Metastasis at presentation**

The presence of metastases at presentation is considered a poor prognostic indicator.

Boston et al (2006) evaluated retrospectively dogs diagnosed with Stage III OSA (defined as OSA that had metastasized to any site) who underwent treatment of any type. The overall MST was 10.9 weeks, which is shorter than that reported in other studies (which included dogs of any disease stage) describing surgery as sole treatment: 14.5 weeks (Shapiro et al, 1988); 25 weeks (Maudlin et al, 1988); 19.2 weeks (Spodnick et al, 1992) or surgery followed by adjuvant chemotherapy: 33.6-59 weeks (Kraegel et al, 1991; Straw et al, 1991; Thompson et al, 1992; Berg et al, 1992; Berg et al, 1995; Bergman et al, 1996; Berg et al, 1997; Bailey et al, 2003; Kent et al, 2004; Chun et al, 2005; Bacon et al, 2008; Phillips et al, 2009). In the paper by Boston et al (2006), dogs treated with palliative radiation therapy and chemotherapy had a significantly longer survival time (130 days) than dogs in all other treatment groups. The proposed reason for this was that the primary tumour remained which suppressed the progression of metastases. Removal of a primary tumour may lead to an increase in angiogenic activity and rapid growth of metastases. (Tsunemi et al, 2003). The alternative theory was that a definitive histopathological diagnosis might not have been made for these patients, with the diagnosis being based on typical signalment and radiographic findings only.

Boston et al (2006) also found dogs with bone metastases had a longer survival time (132 days) than dogs with lung (59 days) or lymph node (57 days) metastases. The six dogs that survived the longest (from 359-1583 days) all had metastasis to long bones with no evidence of pulmonary metastases. Proposed theories for this included metastatic OSA confined to bone could be a distinct clinical entity that is less aggressive than OSA that has metastasized to lung and bone; or dogs with pulmonary lesions are predisposed to development of pulmonary tumour emboli and sudden death

during surgery; or dogs with pulmonary lesions show more systemic signs of illness prompting earlier euthanasia by owners. This is in contrast to Meyers et al (1993) who reported that humans with bone metastases had shorter survival times than those with lung metastases.

Bielack et al (2002) reported that in their human patients clinically detectable metastases were an independent adverse prognostic factor in all analyses. The proposed reason for the low success rate in primary metastatic disease was not that chemotherapy is less effective, but that complete surgery is difficult to accomplish.

Hillers et al, (2005) reported on the prognostic significance of lymph node metastasis in dogs with appendicular OSA. Ten out of 228 dogs (4.4%) included in the study had histologic evidence of regional lymph node metastasis at the time of amputation. The axillary lymph nodes were affected in 3 dogs, the superficial cervical lymph nodes in 1 dog, and the popliteal lymph nodes in 2 dogs. In the remaining 4 dogs, location of the regional lymph nodes in which metastases were found was not recorded. Median DFI for dogs without regional lymph node metastasis (238 days) was significantly ( $P < 0.001$ ) longer than median DFI for dogs with regional lymph node metastasis (48 days). Similarly, median OST for dogs without lymph node metastasis (318 days) was significantly ( $P < 0.001$ ) longer than median OST for dogs with lymph node metastasis (59 days).

### **Completeness of surgical excision**

The importance of achieving complete resection of the primary OSA tumour is logical. The smaller the overall tumour burden, the more likely time to disease recurrence will be longer. Bielack et al (2002) stated that 'the prognostic importance of complete surgery cannot be overstressed'. In their series, failure to achieve a complete remission was a strong negative prognostic factor. This factor was also considered to be significant by Pakos et al (2009).

Similarly in dogs, in their study of dogs with axial OSA, Hammer et al (1995) identified surgical margin as prognostic on univariate and multivariate analyses, with incomplete resection correlating with a poorer outcome. These authors hypothesized that the higher local recurrence rate of axial OSA tumours is associated with the difficulty in achieving complete excision due to location (e.g. vertebrae).

Kuntz et al (1998) reported that in dogs with proximal humerus OSA undergoing adjuvant chemotherapy after limb-spare surgery, the completeness of surgical margins was prognostic for development of metastatic lesions on multivariate analysis. Dogs with incomplete surgical margins were 7.7 times more likely to develop metastases than dogs with complete surgical margins. Incomplete surgical margins were associated with significant increases in the incidence of both local recurrence and distant metastasis. The authors hypothesized that this may be due to the persistence of malignant tumour cells at the surgical site resulting in a greater opportunity for systemic spread or, more likely, because tumours with higher metastatic potential are likely to be more locally aggressive and therefore difficult to completely excise.

In 2002, Kirpensteijn et al also found in their study assessing pathological submissions

that dogs with complete surgical resection had an increased OST compared with dogs with incomplete or no resection at all.

This prognostic factor is of less overall importance in dogs as limb amputation is more commonly performed to remove primary OSA, as opposed to limb-spare surgery which is more commonly employed in humans. However, if more veterinary institutions adopt limb-sparing surgery, it will be important to ensure that patients are only recruited if the surgeon is confident that complete excision of the tumour will be achieved. Currently, the guidelines as to which canine patients are eligible for limb-spare surgery of the distal radius dictate the primary neoplasm must involve less than 50% of the bone length. (Lascelles et al 2005).

### **Tumour diameter and volume**

Misdorp and Hart (1979) first proposed the correlation between tumour size or volume and outcome. They found that OSA of large diameters and volumes were more likely to have pulmonary metastases at necropsy.

Further support for this correlation came from Forrest et al (1992), who identified a statistically significant relationship between time to metastasis and the radiographic tumour area.

Kuntz et al (1998), in their study describing limb-sparing surgery in dogs with OSA of the proximal humerus, found that the overall survival time in their study was shorter compared to that previously reported for appendicular OSA treated with adjuvant chemotherapy. These authors postulated that the relatively large size of proximal humeral OSA might be responsible for this difference.

In a similar study describing limb-sparing surgery in dogs with OSA of the radius, Lascelles et al (2005) found there was a significant relationship between the percentage length involved and overall survival, although there was a comment that this should be interpreted with caution as some data was missing which may have interfered with the statistical modeling.

Larger tumor size has also been reported to be a negative prognostic factor in human osteosarcoma. (Davis et al, 1994; Spanier et al, 1990; Bieling et al, 1996; Brostrom et al, 1982; Taylor et al, 1989)

Bielack et al (2002) confirmed in their large retrospective study the prognostic importance of tumour size in the extremities. However, there was no correlation between tumour size and response to treatment. These authors proposed that the higher risk of relapse in patients with large primary tumours is more likely to be attributable to an increased metastatic burden parallel to tumour size. The studies reviewed by Pakos et al (2009) consistently reported larger tumours to be of negative prognostic significance, although whether it is large size (length) or large volume that is the more important measurement could not be determined.

### **Histologic grade and mitotic index**

Kirpensteijn et al (2002) used a 3-tier grading scheme incorporating degree of pleomorphism, number of mitoses, amount of tumour matrix, number of tumour cells and degree of necrosis. Using this scheme to classify 166 primary OSA and 34 metastatic OSA lesions, there were 4.2% grade I, 20.5% grade II, and 75.3% primary grade III OSA. The 34 metastases were all grade III tumours. Grade I and grade II OSA, which represents approximately 25% of the OSA reported in this study, had a significantly better prognosis than grade III OSA. Grade III tumours were associated with a significantly decreased OST and DFI. These authors believe that histologic grade provides a better assessment of the biologic aggressiveness of OSA tumours than subtype. As tumour grading is a relatively simple procedure without additional costs, it should be performed prior to treatment. Interestingly, several specific histologic variables, such as pleomorphism, proportion of tumour cells, amount of matrix, degree of necrosis and invasiveness, did not show any significant effect on survival data. The histologic variables associated with an increased risk were the number of mitoses and tumour cell invasion into blood vessels.

Moore et al (2007) found that in 121 biopsy specimens that could be assessed, tumour grade itself was not a predictor of survival. The criteria differed from those used by Kirpensteijn et al (2002) (e.g. inclusion of vascular invasion). However, similar to Kirpensteijn et al (2002), the number of mitoses was a predictor of survival, with decreasing survival times seen as the mitotic rate increased. A categorical mitotic index which could potentially be prospectively applied was not described.

Loukopoulos and Robinson (2007) found a correlation between tumour histological grade and various clinicopathological parameters, such as metastasis, age, tumour

location and histopathological subtype. A score was assigned to the degree of nuclear pleomorphism, mitotic rate and degree of necrosis. This cumulative score was then translated into a tumour grade. There were 28% grade I, 37% grade II and 35% grade III tumours. Higher-grade tumours were seen in primary tumours that had metastasized; appendicular versus axial tumours; and OSA arising from the rib. Cranial OSA was of a significantly lower grade.

Using a grading scale incorporating amount of tumour matrix, as well as degree of necrosis, degree of nuclear pleomorphism and mitotic index, for 69 tumour biopsy samples, Phillips et al (2009) classified 30.4% as low grade, 46.4% as intermediate grade, and 23.2% as high grade. Tumour grade had no impact on prognosis for either DFI or OST in this study of dogs with appendicular OSA.

Saam et al (2011) used the histologic grading scheme described by Kirpensteijn et al (2002), although the presence of lymph node metastasis did not generate an automatic grade of III. Of the 38 biopsy samples analysed, there were 21% grade I, 47% grade II and 32% grade III. There was a significant difference in outcome between grade III tumours compared with grade I or II tumours, with increasing grade associated with a poorer outcome. Of the individual variables, a mitotic index  $>5$  per 3hpf and the presence of tumour cells in blood vessels were factors for a poor prognosis.

Straw et al (1996), in their analysis of canine mandibular OSA, classified 7 dogs with grade I, 33 dogs with grade II, and 5 dogs with grade III tumours. While dogs with grade II tumours tended towards a shorter OST, this was not statistically significant. With such small numbers of dogs with grade I and III tumours, the power to detect significance in this study was likely to be too low. Hammer et al (1995) also reported



that histological grade was not of prognostic significance in their analysis of dogs with axial OSA.

Tumour grade is not routinely recorded on histopathological reports diagnosing canine OSA. A unified classification scheme is required to be prospectively applied to a larger number of cases to determine its utility. Of the categories that comprise the tumour grade, the mitotic index appears to be the most frequently prognostic as an individual marker. Tumours with a MI greater than 5 per 3/hpf may have a poorer prognosis.

### **Tumour subtype**

The histopathologic subtype has been proposed as being a prognostic factor in patients with OSA. Overall, the results below do not support this, although differing classification schemes have been used, making comparison and amalgamation of results from all studies difficult, if not impossible.

Misdorp and Hart (1979) reported that in 144 dogs with OSA, 47% were classified as osteoblastic, 23% were chondroblastic, 14% were fibroblastic, and 15% were chondroblastic-fibroblastic. The fibrosarcomatous subtype was found to be associated with a relatively favourable prognosis compared to other subtypes.

In the World Health Organisation International Histological Classification of Tumors in Animals, Slayter et al (1994) described eight histological subtypes for canine OSA: poorly differentiated; osteoblastic productive; osteoblastic non-productive; chondroblastic; fibroblastic; telangiectatic; and giant cell type. These authors do not attest that the subtypes are indicative of prognosis, but rather present the subtypes to allow diagnostic recognition.

Kirpensteijn et al (2002) classified 166 canine OSA tumours as osteoblastic (52.4%), chondroblastic (3.0%), fibroblastic (3.0%), mixed fibro- and osteoblastic (15.7%), mixed chondro- and osteoblastic (10.2%), mixed telangiectatic and osteoblastic (7.2%), mixed fibro-, chondro-, and osteoblastic (5.4%), mixed telangiectatic, fibro-, and osteoblastic (2.4%), and mixed telangiectatic, chondro-, and osteoblastic (0.6%). These authors argued that the importance of the subtyping is limited because the histologic features vary greatly both between tumours and within tumours. No subtypes were associated with a significantly better or worse prognosis in their study.

Loukopoulos and Robinson (2007) used the subtypes described by Slayter et al (1994), although the term 'osteoblastic-minimally productive' was used instead of 'osteoblastic non-productive'. The osteoblastic-productive subtype was the most commonly observed. There were no significant differences between subtypes with respect to mitotic index, degree of necrosis or degree of pleomorphism. Tumour grade was significantly different between the osteoblastic-minimally productive and fibroblastic subtypes. For this result alone, these authors argue that subtyping is beneficial and may provide prognostic information.

Ehrhart et al (1998) classified tumours into five histologic subtypes. There were 48% osteoblastic, 16% fibroblastic, 16% poorly differentiated, 12% telangiectic, and 8% chondroblastic. Histologic subtype was not associated with preoperative TALP or BALP concentrations.

Moore et al (2007) classified tumours into seven histologic subtypes. This information was recorded for 225 of the 303 dogs included in their study. There were 63% osteoblastic, 15% undifferentiated, 12% fibroblastic, 7% chondroblastic, and 1% telangiectatic, osteoclastic and sclerosing. Histologic subtype did not significantly affect survival.

Phillips et al (2009) classified tumours into five subtypes. This information was recorded for 71 of the 155 dogs included in their study. There were 70% osteoblastic, 8.5% fibroblastic, 8.5% telangiectatic, and 13% classified as 'other', which included chondroblastic and osteoclastic. Histological subtype had no impact on prognosis for either DFI or OST.

Subtype classification has also been applied to axial OSA. Hammer et al (1995) classified axial OSA tumours into five subtypes. There were 64% osteoblastic, 16% compound, 9% fibroblastic, 9% telangiectic and 2% chondroblastic. There did not appear to be an association between subtype and anatomic location. Subtype was also not of prognostic significance. Straw et al (1996) classified their 51 mandibular OSA into osteoblastic 45%, chondroblastic 16%, fibroblastic 10%, sclerotic 8%, poorly differentiated 6% and telangiectic 4%. There was no significant difference in OST between subtypes.

Overall, it appears that the histological subtype of OSA is not a useful prognostic factor in dogs with appendicular or axial OSA.

### **Tumour microvessel density**

Coomber et al (1998) evaluated the possible contribution of vascularity to differences in disease progression and metastatic behaviour. They found no significant differences in mean vessel density when comparing male versus female cases, or appendicular versus axial cases. When cases were divided based on metastatic status, significant differences in vascular density were seen. Animals presenting with gross metastases had significantly higher vessel densities in their primary tumours than animals that later developed gross metastases. Animals without gross metastasis at death had intermediate vascular densities. These were significantly different from animals presenting with gross metastases, but not from animals later developing gross metastases.

These results support the notion that the higher the number of blood vessels within a tumour, the faster the rate of growth of the primary tumour, and the higher the risk of metastatic disease developing due to provision of a route for tumour emboli to travel through.

Tumour MVD assessment is not currently assessed routinely on histopathological assessment of OSA biopsy samples as it requires immunohistochemistry using antibodies to von Willebrand Factor to highlight blood vessel endothelium, which are not available in all laboratories. It is also not known whether the increase in MVD occurs before or after shedding of micrometastatic tumour emboli. If it could be confirmed that the increase in MVD only occurs after release of tumour emboli, dogs with very low MVD may only require surgery to remove the primary tumour, and not adjuvant chemotherapy which is aimed at micrometastatic disease. This scenario is unlikely as surgical cure is very rare, as reported by Spodnick et al (1992).

### **Tumour necrosis after chemotherapy**

Tumour necrosis after pre-operative chemotherapy is a well-recognized prognostic factor in human medicine. Percentage necrosis is used to modify postsurgical chemotherapy protocols. Bielack et al (2002) stated that tumour response to preoperative chemotherapy was probably the most important prognostic factor in primary, localized extremity OSA.

In humans, low rates of local recurrence have been reported for tumours in which the amount of necrosis induced by preoperative chemotherapy is high. In addition, the responsiveness of the primary tumour to preoperative chemotherapy may predict the responsiveness of the micrometastases. (Simon and Nachman, 1986), Among people who receive preoperative chemotherapy, death attributable to metastatic disease is less common if the resected primary tumour is more than 90% necrotic than if it is less than 90% necrotic. (Rosen et al, 1982).

Powers et al (1991) demonstrated with their analysis of biopsy specimens from 200 dogs, that tumour necrosis was strongly correlated with local tumour control. Importantly, however, there was no correlation between tumour necrosis and time to metastasis, which most commonly leads to the ultimate demise of the canine patient.

Berg et al (1995) reported that there was a significant direct correlation between survival time and percentage of the primary tumour that was necrotic following pre-operative chemotherapy. This study also demonstrated that there was no difference in survival times, or percentage of the primary tumour that was necrotic, between dogs undergoing surgery after the second or third dose of doxorubicin. Therefore limb

amputation could be performed after two doses of chemotherapy if analgesia is not controlling pain from the primary bone lesion.

The question of whether neoadjuvant chemotherapy conveys a survival benefit in humans has not been definitively answered. If surgery is performed upfront, the chance to evaluate response to chemotherapy, and thus one of the most reliable prognostic indicators, is lost. Also, it has been documented that the local recurrence rate decreases with increasing preoperative tumour cell destruction. (Bielack et al, 2002) This latter point is more relevant for humans where limb-spare surgery is more commonly performed, compared to dogs where radical surgery (limb amputation) is still more common. Local recurrence is of little concern in dogs treated with amputation, and while the knowledge of the percentage of tumour killed is an important prognosticator, at this point in time, there are few alternative treatment options available for dogs if results indicated lack of sensitivity to the preoperative chemotherapy drug. Early limb amputation for palliative reasons is still a more prudent option, allowing the patient to regain pain-free quality of life as soon as possible.

### **Delayed initiation of chemotherapy following surgery**

A study using a murine mammary tumour concluded that to achieve the most effective control of metastases, the largest tolerable dose of chemotherapy should be given at the time of, or before, primary tumour removal. (Fischer et al, 1983). It was hypothesized that the primary tumour may suppress the growth of micrometastases, leading to sudden rapid growth of the micrometastases following amputation, which may be more susceptible to chemotherapy. (Fischer et al, 1983). A study using dogs with spontaneous occurring osteosarcoma of the appendicular skeleton could not confirm this. It found the timing of the administration of the first chemotherapy treatment did not influence overall survival. (Berg et al, 1997) Similarly, Chun et al (2005) found that the timing of the first chemotherapy treatment was not significantly associated with survival.

Post-operative chemotherapy is often delayed for 14 days after surgery due to concerns of delayed wound healing and risk of infection secondary to chemotherapy-induced myelosuppression. This concern may be unfounded as Berg et al (1995) administered doxorubicin one day after surgery to 35 dogs and had no post-operative complications.

In a study by Bacon et al (2008), dogs that began chemotherapy more than 14 days after amputation had a significantly longer DFI than those that began 14 days or less after amputation. This difference was not significant in multivariate analysis and was most likely a result of study design as it is unlikely that delaying chemotherapy for long periods after amputation will inhibit growth of micrometastatic disease.



### **Molecular prognostic markers**

Assessing molecular markers is an expanding area of research in both human and veterinary oncology. At this time, there is very little information published to confirm their importance in the diagnosis or prognosis of canine OSA.

The tumour suppressor gene p53 has been assessed by Loukopoulos et al (2003). In this study of 167 canine bone tumours, p53 staining was higher in OSA versus other tumours. Also, an increase in p53 staining was associated with a higher histologic grade, mitotic index and degree of tumour necrosis. However, p53 staining was not associated with the presence of metastases.

Cyclooxygenase-2 (COX-2) expression was analysed by Mullins et al (2004). Of 44 canine OSA biopsy samples that were analysed, 77.3% stained positively for COX-2, although the majority (88%) had poor to moderate staining. Dogs with strong COX-2 expression had significantly decreased OST compared to dogs with negative or poor staining.

Ezrin is a membrane-cytoskeleton linker protein associated with metastasis. Khanna et al (2004) detected ezrin in 83% of canine OSA. A high level of ezrin staining in the tumour was associated with a significantly shorter DFI compared with dogs with low levels of staining.

Matrix metalloproteinases (MMPs) are proteases capable of degrading the extracellular matrix, but they also have numerous other actions. Lana et al (2000) demonstrated that canine OSA cells in biopsy specimens had a greater expression of MMPs than unaffected stromal cells, suggesting they may play a role in metastasis by allowing

tumour cells to degrade the extracellular matrix and invade nearby vasculature. Moore et al (2007) demonstrated that higher plasma active concentrations of MMP-2 were associated with shorter OST. However, administration of an MMP inhibitor, BAY 12-9566, did not result in a significantly longer OST compared with doxorubicin chemotherapy alone.

Fan et al (2008) demonstrated that 10/15 canine OSA primary tumours and 9/12 pulmonary metastases expressed tropomyosin-related kinase (Trk-A), a proto-oncogene that protects against apoptosis. These authors did not attempt to determine whether this has prognostic relevance, but suggest this may be a novel therapeutic target.

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## **PART FOUR**

# **Toxicity and efficacy of a novel doxorubicin and carboplatin chemotherapy protocol for the treatment of canine appendicular osteosarcoma following limb amputation**

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**Objective** To evaluate the safety and efficacy of a novel doxorubicin and carboplatin chemotherapy protocol for the treatment of dogs with appendicular osteosarcoma following limb amputation.

**Design** Retrospective study

**Procedure** Dogs diagnosed with appendicular osteosarcoma, with no evidence of metastatic disease, treated with amputation and adjuvant chemotherapy consisting of two doses of doxorubicin given 14 days apart, followed by four doses of carboplatin at 3-weekly intervals between September 2003 and December 2009 were identified from the medical records of Perth Veterinary Oncology. Haematological and gastrointestinal toxicities were assessed based on information in the medical records and recorded complete blood count results. The efficacy of the protocol was assessed by determining the median disease-free interval (DFI) and overall survival time (OST) using the Kaplan-Meier product-limit method.

**Results** In total, 33 dogs met the inclusion criteria. The median DFI was 231.5 days and the median OST was 247 days. With regard to haematological toxicity, 56% of dogs had a grade 1–2 neutropenia recorded as their highest

marrow toxicity and 9% of dogs experienced a grade 3–4 neutropenia, all subsequent to doxorubicin administration. The highest gastrointestinal toxicity was grade 1–2 in 15 dogs (47%) and 5 dogs (16%) experienced grade 3–4 gastrointestinal toxicity.

**Conclusion** This chemotherapy protocol did not result in a longer time to disease recurrence or OST in this population of dogs. Dual-agent protocols have failed to improve survival times and therefore we conclude that a single-agent protocol using carboplatin may be equally effective with less toxicity.

**Keywords** carboplatin; dogs; doxorubicin; osteosarcoma

**Abbreviations** ALP, alkaline phosphatase; AUC, area under the (concentration-versus-time) curve; BSA, body surface area; CBC, complete blood count; DFI, disease-free interval; OSA, osteosarcoma; OST, overall survival time; VCOG-CTCAE, Veterinary Cooperative Oncology Group common terminology for adverse events

Osteosarcoma (OSA) of the appendicular skeleton is the most common primary bone tumour in dogs. It is behaviorally a very aggressive neoplasm and most dogs will eventually develop metastatic disease, frequently in the lungs and/or other bones.<sup>1</sup> Treatment needs to be directed at controlling the primary tumour and the microscopic metastatic disease, and the current standard of care is limb amputation or limb-sparing surgery, followed by adjuvant chemotherapy. Two studies published in 1988 provided early evidence that adjuvant chemotherapy may prolong patient survival times. Shapiro et al. demonstrated a significantly longer median survival time of 43 weeks in 11 dogs treated with amputation and adjuvant cisplatin, compared with their control group of eight dogs treated with amputation alone, which had a median survival time of 14.5 weeks.<sup>2</sup> Mauldin et al.

also demonstrated that the median survival time of 300 days for 19 dogs treated with amputation and adjuvant doxorubicin and cisplatin was significantly longer than the median survival time of 175 days for 19 dogs treated with amputation alone.<sup>3</sup> Since then, numerous adjuvant chemotherapy protocols using varying combinations and schedules of doxorubicin and/or the platinum agents, cisplatin or carboplatin, have been studied.<sup>4–16</sup> These protocols have offered median survival times ranging from 235 to 413 days. Many of these studies used data published by Spodnick et al.<sup>17</sup> as a historical control group. In that retrospective study, 162 dogs treated with amputation alone had a median survival time of 19.2 weeks. Direct comparisons of the outcomes of any of these studies is difficult given their differing inclusion criteria, study design and, at times, small case numbers. What can be concluded is that both doxorubicin and the platinum agents prolong survival in dogs with osteosarcoma after amputation or limb-sparing procedures. What has not yet been determined is the ideal chemotherapy protocol that provides long-term survival with minimal associated toxicity. Combination chemotherapy is more likely to provide a longer duration of remission, because each drug, with its different mechanism of action, has a different effect on a heterogeneous tumour cell population, which may prevent or slow development of drug resistance.<sup>18</sup> The chemotherapy protocol used in our institution is the first combination chemotherapy protocol described that uses doxorubicin sequentially at a 14-day interval. This dose intensity was selected because doxorubicin monotherapy did not provide a survival benefit when given on a 21-day cycle,<sup>19</sup> but did improve survival times when given at the higher dose intensity of a 14-day cycle.<sup>8,20</sup>

The aim of this single-centre retrospective case series study was to evaluate the safety and efficacy of a chemotherapy protocol consisting of two doses of

doxorubicin given 14 days apart, followed by four doses of carboplatin at 3-weekly intervals, for the treatment of dogs with appendicular osteosarcoma, all of which had undergone amputation. A secondary aim of this study was to assess patient-, tumour- and treatment-related factors for prognosis.

### **Materials and methods**

Dogs that were diagnosed with appendicular osteosarcoma and treated with amputation and adjuvant chemotherapy between September 2003 and December 2009 were identified from the medical records of Perth Veterinary Oncology. The evaluated protocol was the standard offered at that time. Dogs that received at least one chemotherapy treatment were considered to have started the protocol and were included in this study. Information was collected from the medical records and from contact with the referring veterinarian or the owner. Dogs were excluded from the study if there was evidence of metastatic disease detected during initial staging or if the patient record was incomplete.

Dogs were staged using one or all of the following diagnostic tests: complete blood count (CBC), serum biochemistry, urinalysis, three-view thoracic radiographs, computed tomography of the thorax and abdomen, fine needle aspirate cytology of the regional lymph node, and abdominal ultrasound. The diagnosis of osteosarcoma was confirmed by histopathology in all cases at the time of amputation, regardless of whether a preoperative biopsy had been performed. Histopathological subtype or grade was not routinely recorded, so this parameter was not assessed in the survival analyses for its prognostic influence.

The time between surgery and the start of chemotherapy varied between patients and was dependent on when the owners assessed the dogs to have recovered from amputation sufficiently to commence chemotherapy.

Chemotherapy consisted of six treatments: two cycles of doxorubicin at a 14-day interval, followed by four cycles of carboplatin on a 21-day cycle. Doxorubicin was dosed at 30 mg/m<sup>2</sup> IV (1 mg/kg in dogs <15 kg) and carboplatin was dosed at 300 mg/m<sup>2</sup> IV. Each dog had a CBC immediately prior to each treatment. A CBC was also performed 7 days after the first doxorubicin dose and 7–10 days after the first carboplatin dose. Dogs with pretreatment neutropenia <1500 cells/μL (reference range, 3.9–8.0 cells/μL) had their treatment delayed and were rechecked 7 days later to assess if the neutropenia had resolved. The decision to reduce subsequent doses of the drug was at the discretion of the clinician and owner. The protocol was discontinued if there was evidence of metastatic disease. At the completion of chemotherapy, it was recommended clients have their dogs rechecked every 3 months for at least 2 years at either Perth Veterinary Oncology or their referring veterinarian. During these examinations thoracic radiography was recommended. Haematological toxicity, specifically neutropenia, was assessed by evaluating the recorded CBC results and was graded according to the Veterinary Cooperative Oncology Group's common terminology for adverse events (VCOG-CTCAE) (Table 1).<sup>21</sup> The highest grade of toxicity experienced by each dog for either doxorubicin or carboplatin was recorded. Gastrointestinal toxicity was assessed by evaluating the medical records as reported by the owner during treatment and was also graded according to the VCOG-CTCAE criteria. The highest grade of toxicity for either doxorubicin or carboplatin was recorded.

The disease-free interval (DFI) in days was defined as the interval between amputation and detectable metastasis. Dogs with no evidence of metastasis at the time of writing, that were lost to follow-up or had died from confirmed, unrelated disease were censored from this analysis. Overall survival time (OST) was defined as the interval between amputation and death from neoplasia. Dogs with



unconfirmed causes of death were considered to have died from neoplasia. Median DFI and OST were determined using the Kaplan-Meier product-limit method. Log-rank analysis was used to compare DFI and OST among dogs for the following variables: age, body weight, sex, breed, hindleg versus foreleg, duration of clinical signs, serum ALP activity, interval between amputation and chemotherapy, dose reduction or treatment delay required, myelosuppression observed, gastrointestinal toxicosis observed and whether the intended chemotherapy protocol was completed. Any variables identified as significant via univariate analysis for either DFI or OST were tested for significance via multiple logistic regression (Cox's proportional hazards model). Continuous variables were stratified on the basis of the medians for the analyses: age was classified as <8 or ≥8 years, weight was <34 kg or ≥34 kg, duration of clinical signs was <30 or ≥30 days, and the interval between amputation and chemotherapy was <10 or ≥10 days. Results for all tests were considered significant at  $P < 0.05$ .

## **Results**

### ***Case characteristics***

From September 2003 to December 2009, 33 dogs were treated for appendicular osteosarcoma with amputation and the evaluated chemotherapy protocol and so were included in the study. The median age was 8.8 years (range, 4–16 years). The median weight was 34 kg (range, 14.5–54.8 kg). There were 18 neutered females, 1 entire female, 12 neutered males and 2 entire males. The breeds represented were: Rottweiler (n = 10), Australian Cattle Dog (n = 2), Golden Retriever (n = 2), Christmas Island Terrier (n = 1), Rough-coated Collie (n = 1), Border Collie (n = 1), Bernese Mountain Dog (n = 1), Rhodesian Ridgeback (n = 1), Great Dane (n = 1), Kelpie (n = 1) and cross-breeds (n = 12).

### ***Tumour characteristics***

Tumours were detected in the distal femur (n = 7), proximal humerus (n = 7), distal tibia (n = 6), distal radius (n = 4), proximal tibia (n = 3), distal humerus (n = 2), proximal femur (n = 2), scapula (n = 1) and mid-femur (n = 1); 42% were in a forelimb and 58% in a hindlimb, with 39% on a left limb and 61% on a right limb.

Median duration of clinical signs prior to initial presentation was 36 days (range, 1–300 days); 15 dogs had a preoperative biopsy performed and 2 dogs presented with a pathological fracture.

Complete staging was not performed in all dogs because of owner financial constraints. All dogs had a CBC performed prior to their first chemotherapy treatment and 24 dogs had a serum biochemistry panel performed, including alkaline phosphatase (ALP). Of these, 5 had an ALP level above the reference range for the laboratory used (20–184 U/L); however, 2 of the 5 dogs had values only just outside the reference range (186 and 190 U/L), and the dog with an ALP value of 1189 was receiving phenobarbitone concurrently. Urinalysis was performed for 11 dogs, 24 dogs had thoracic radiographs taken, 1 dog had computed tomography of the thorax and abdomen, 4 dogs had an abdominal ultrasound; 8 dogs had fine needle aspirate cytology performed on the regional lymph node, and all were negative for metastatic disease.

### ***Treatment protocol***

Limb amputation was performed either by the referring veterinarian prior to presentation to the referral institution, or after initial assessment and staging was performed. The type of amputation performed was dependent on the surgeon's preference and what was required to remove all visible tumour. There were 10 forequarter amputations (including scapula), 4 mid-humeral amputations, 12

coxo-femoral disarticulations, and 3 mid-femoral amputations; 4 dogs did not have this information in their records. The median time between surgery and chemotherapy was 10 days (range, 1–35 days).

In total, 8 dogs did not complete the intended chemotherapy protocol; 6 of these dogs had treatment discontinued because of metastatic disease, 1 dog discontinued treatment after the third dose because of marked treatment-related toxicosis and 1 dog only received four treatments because of owner financial constraints.

### ***Toxicosis***

A total of 66 doses of doxorubicin and 116 doses of carboplatin were administered. One dog had no toxicity data recorded and was excluded from this analysis. In 18 dogs (56%), a grade 1–2 neutropenia was recorded as the highest marrow toxicity, and 3 dogs (9%) experienced a grade 3–4 neutropenia, all subsequent to doxorubicin administration. Of these 3 dogs, 1 required no treatment, 1 was treated as an outpatient with oral antibiotics and 1 dog also experienced grade 4 gastrointestinal toxicity and required hospitalisation for 5 days for IV fluids, antibiotics, antiemetic and gastric protectant medication. That dog was a Rough-coated Collie and it was postulated she carried an MDR1 gene mutation leading to the severe toxicosis following doxorubicin, a P-glycoprotein-substrate drug.

In 15 dogs (47%), a grade 1–2 gastrointestinal toxicity was recorded as the highest toxicity, and 5 dogs (16%) experienced grade 3–4 gastrointestinal toxicity, one of which was the dog described above. Another two of the dogs required hospitalisation for 1–3 days for supportive care and two dogs required no specific therapy.

Five dogs (16%) required a dose reduction for the second doxorubicin treatment because of either haematological (n = 4) or gastrointestinal toxicity (n = 1). No

dogs required a dose reduction for the carboplatin treatments. Five dogs required treatment delays because of slow haematological recovery: 1 dog had a 1-week delay before the second doxorubicin dose; 3 dogs required treatment delay after the first carboplatin dose, and then received the subsequent three doses at 4-week intervals; 1 dog had a 1-week delay before the third carboplatin dose, but returned to the 21-day cycle before the fourth dose.

### ***DFI and survival***

The median DFI was 231.5 days and the median survival time was 247 days (Figure 1). The 1-year survival rate was 24.2% and the 2-year survival rate was 15.2%.

Of the variables assessed for prognostic significance, only completion of the chemotherapy protocol and body weight were significant. Dogs weighing <34 kg had an OST of 447 days compared with 151 days for dogs ≥34 kg ( $P = 0.01$ ) (Figure 2). Age, sex, breed, hindleg versus foreleg, duration of clinical signs, serum ALP activity, interval between amputation and chemotherapy, dose reduction or treatment delay required, myelosuppression and gastrointestinal toxicosis did not influence DFI or OST.

At the time of data analysis, 2 dogs were still alive with no evidence of metastatic disease and 2 dogs were lost to follow-up and a date and cause of death could not be determined. Of the other 29 dogs, 17 died of metastatic osteosarcoma in the lungs ( $n = 9$ ) or bones ( $n = 6$ ) or both ( $n = 2$ ), confirmed radiographically; 4 dogs were euthanased because of severe or progressive paresis or weakness of undetermined cause. Radiographs or myelography were not performed in those dogs to determine the underlying problem.

Another 5 dogs were suspected to have died from neoplasia but it was not confirmed. One dog developed lethargy and non-localised pain that progressed

over a 1-month period. It was treated with analgesics, but euthanased when the pain became intractable. One dog developed lethargy and anorexia 7 months after completing chemotherapy, but no further diagnostic tests were performed before euthanasia. Another dog also developed lethargy and anorexia, leading to marked weight loss over a 2-month period. The dog then developed widespread bruising over the ventrum and was euthanased with no further diagnostic tests performed. The fourth dog developed seizures between chemotherapy treatments five and six. Metastasis to the brain was suspected but not confirmed with imaging or necropsy. The fifth dog developed gastrointestinal disease 5 months after completion of chemotherapy. Abdominal ultrasound showed a large mass medial to the right kidney, measuring  $4.5 \times 4.3$  cm. The owner declined further diagnostics and treatment and the dog was euthanased 2 days later after no clinical improvement. Three dogs died of unrelated disease. One dog ruptured a cranial cruciate ligament and the owner elected euthanasia at this time, despite radiographs of the limb and thorax showing no evidence of metastases. Another dog developed spinal pain and hindlimb ataxia. Thoracic and vertebral radiographs showed no evidence of metastatic disease, but did demonstrate multiple narrowed disc spaces, suggestive of intervertebral disc disease. The third dog became lethargic and anorexic 1 month after finishing chemotherapy. Investigation by the referring veterinarian included CBC and serum biochemistry blood tests, and radiographs of the thorax. The dog had a packed cell volume of 0.25, platelet count of  $49 \times 10^9$  cells/L and neutrophil count of  $0.65 \times 10^9$  cells/L. The radiographs showed a pattern suggestive of pneumonia. The owner declined further treatment and elected euthanasia. Necropsy was not performed to rule out neoplasia as the underlying cause of disease.

## Discussion

The median DFI and OST of 231.5 and 247 days, respectively, were similar to previously published results. Although the DFI or time to disease progression is a more accurate assessment of treatment efficacy, because of the retrospective nature of this study the follow-up intervals and diagnostic tests varied and depended on owner compliance. In some cases, the recorded DFI was the same as the OST, because the dog was only presented for assessment when it became unwell. Therefore, the OST has been used more consistently in this study.

Not surprisingly, the dogs that completed the chemotherapy protocol had a significantly longer median OST (289 days) compared with the dogs that did not complete the treatment (108 days;  $P = 0.0002$ ). Six of the eight dogs that did not complete the protocol had developed early evidence of metastatic disease, leading to shorter survival times.

Of the other variables assessed, dogs weighing  $<34$  kg ( $n = 16$ ) had statistically significant greater OSTs. Bergman et al. had a similar finding in their study describing amputation and carboplatin for the treatment of appendicular osteosarcoma in dogs; dogs  $<40$  kg had a significantly longer DFI and OST.<sup>9</sup> Moore et al. also showed that increasing body weight predicted a shorter survival in their population of dogs with osteosarcoma treated with amputation and doxorubicin.<sup>20</sup> The dose of doxorubicin is recommended to be given on a milligram per kilogram basis for dogs  $<10$  kg, as myelosuppression is significantly greater in small dogs when dosed according to their body surface area (BSA). The area under the concentration-versus-time curve (AUC) is also greater in small dogs if they are dosed according to BSA.<sup>22</sup> It is possible that larger dogs are being relatively under-dosed when dosed according to their BSA, leading to shorter survival times. No dogs in our study weighed less than 10 kg and only six dogs weighed less than

20 kg bodyweight. In humans, the Calvert formula is now commonly used to calculate the carboplatin dose:

$$\text{AUC}_{(\text{carboplatin})} = \text{dose}/(\text{creatinine clearance} + 25),$$

where the usual AUC is 4, 5 or 6 mg/m<sup>2</sup> per minute.<sup>18</sup> The AUC is the pharmacokinetic parameter that most accurately predicts carboplatin-associated toxicity in humans and cats. The AUC is directly proportional to the dose and inversely proportional to clearance.<sup>23</sup> No studies have been performed to determine whether the AUC dosing strategy for carboplatin would be more appropriate than BSA in dogs.

No other variable had a statistically significant effect on DFI or OST in this study. Variables that have been shown to be prognostic in other studies may have become statistically significant if a larger sample size had accrued in this study.

The current chemotherapy protocol was based on several basic chemotherapy principles. Both doxorubicin and carboplatin have demonstrated efficacy against osteosarcoma as single agents.<sup>8,9</sup> As stated earlier, combination chemotherapy is more likely to provide a longer duration of remission because of the different mechanism of action of each drug having a different effect on the heterogeneous tumour cell population, which may prevent or slow development of drug resistance.<sup>18</sup> Combination chemotherapy protocols, with doxorubicin being an essential component, are currently part of the multimodality approach to the treatment of human osteosarcoma.<sup>24</sup>

A protocol of alternating carboplatin and doxorubicin every 3 weeks for up to three cycles reportedly resulted in DFIs and survival times that were no better than those previously reported for single-agent protocols.<sup>15</sup> The Norton and Day model predicts that the sequential use of drug combinations outperforms alternating cycles, based on the fact that no two combinations are likely to have

equal cytotoxic ability or be completely non-cross-resistant.<sup>18</sup> Therefore, the protocol in the present study commenced with two doses of doxorubicin at 30 mg/m<sup>2</sup> IV given 14 days apart. Previously, doxorubicin was shown not to provide a survival benefit in 14 dogs treated on a 21-day cycle, compared with amputation alone, although this may have been related to the low power of the study with the small number of dogs included.<sup>19</sup> When given on a 14-day cycle, adjuvant doxorubicin did provide an improvement in OSTs.<sup>8,20</sup> In a recent study of dogs with osteosarcoma treated with amputation and adjuvant carboplatin and doxorubicin on an alternating 21-day cycle, dogs that received doxorubicin as their first drug had a significantly longer DFI than those that received carboplatin first.<sup>15</sup> This finding was not significant in multivariate analysis and may just have been a result of study design, but the order of drugs in a treatment schedule may influence their therapeutic effect. Only administering two doses of doxorubicin also minimises the risk of patients developing cardiomyopathy secondary to cumulative drug doses. Although it is recommended not to exceed a cumulative dose of 180–240 mg/m<sup>2</sup> of doxorubicin,<sup>25</sup> breeds at risk of developing dilated cardiomyopathy may have a higher risk after lower doses. Three dogs have developed presumed doxorubicin-induced cardiomyopathy after a total dose of only 150 mg/m<sup>2</sup>.<sup>8</sup>

In our study, carboplatin was administered at 300 mg/m<sup>2</sup> IV every 21 days for four cycles, which has demonstrated efficacy in the treatment of canine osteosarcoma at this dose and frequency.<sup>9</sup>

There is currently no consensus on the ideal time to commence chemotherapy after limb amputation. In the study by Bacon et al., dogs that began chemotherapy more than 14 days after amputation had a significantly longer DFI than those that began 14 days or less after amputation.<sup>15</sup> This difference was not significant in



multivariate analysis and was most likely a result of study design, as it is unlikely that delaying chemotherapy for long periods after amputation will inhibit growth of micrometastatic disease. Postoperative chemotherapy is often delayed for 14 days after surgery because of concerns about delayed wound healing and the risk of infection secondary to chemotherapy-induced myelosuppression. This concern may be unfounded, as Berg et al. administered doxorubicin 1 day after surgery to 35 dogs and had no postoperative complications.<sup>8</sup> A study using a murine mammary tumour model concluded that to achieve the most effective control of metastases, the largest tolerable dose of chemotherapy should be given at the time of, or before, primary tumour removal.<sup>26</sup> It was hypothesised that the primary tumour may suppress the growth of micrometastases, leading to sudden rapid growth of the micrometastases following amputation, which may be more susceptible to chemotherapy.<sup>26</sup> A study using dogs with spontaneous occurring osteosarcoma of the appendicular skeleton could not confirm this. It found the timing of the administration of the first chemotherapy treatment did not influence overall survival.<sup>10</sup> Our study also found no statistically significant difference in the DFI and OST between dogs that started chemotherapy less than 10 days following amputation compared with those that commenced treatment at 10 days or later.

The combination chemotherapy protocol in this study was associated with frequent toxicity. Of the 25 dogs that received all six doses and had toxicity data available, only 3 recorded no toxicity. However, the majority of adverse effects recorded were mild and required no specific treatment. Of the 33 dogs that commenced the protocol and had toxicity data available, neutropenia was identified in 65% of dogs, of which only 9% were grade 3–4. Gastrointestinal toxicosis occurred in 63% of dogs, of which 16% were grade 3–4. This is higher than in previous studies where doxorubicin or carboplatin was used as a single

agent. Berg et al., using doxorubicin as a single agent every 14 days, reported that 2 of 35 dogs (6%) had marked gastrointestinal toxicosis after the first doxorubicin dose and were withdrawn from the study, but that no other dog developed clinically important signs of gastrointestinal toxicosis.<sup>8</sup> In the same study, 2 dogs (6%) developed severe neutropenia and fever 4–5 days after the first doxorubicin dose, but then received their subsequent treatments at a reduced dose with no further adverse effects.<sup>8</sup> Bergman et al., using carboplatin as a single agent every 3 weeks, reported that 9 of 48 dogs (19%) had mild and transient episodes of vomiting.<sup>9</sup> One dog required hospitalisation and IV fluid therapy to treat dehydration secondary to vomiting after the first treatment and was withdrawn from the study. One dog (2%) developed severe neutropenia and sepsis and the owner elected euthanasia. Two dogs had unexplained deaths that were attributed to carboplatin toxicosis even though this could not be confirmed in either case.

The difference in the toxicosis rate of the current study and those just described may be related to a different grading scheme or more complete records being available. It is possible that there is increased toxicity with the combination of drugs, although given their sequential, not concurrent, administration, this is unlikely. Despite the higher percentage of toxicosis recorded in the current study, no dogs died as a result of treatment and only one dog was withdrawn from treatment because of owner concerns regarding side effects. Of the 31 dogs that received both prescribed doxorubicin treatments, six (19%) required a dose reduction for their second dose. Of the 25 dogs that received all four prescribed carboplatin treatments, none required a dose reduction, although 4 (16%) required a treatment delay.

### ***Study limitations***

This study had a relatively small sample size and lacked a control group with randomisation of patients between groups. Using a historical control may not allow accurate comparison, because of differing study designs and case management of different institutions. Retrospective studies also rely heavily on patients' records, which may not be complete, leading to potential under-reporting of toxicosis. Patient follow-up is also reliant on the owner's compliance and financial position, so there is often marked variability in the frequency and extent of patient reassessment.

### **Conclusion**

The chemotherapy protocol described here, although designed to adhere to basic chemotherapy principles, did not result in a longer time to disease recurrence or overall survival time in this population of dogs. The rate of toxicosis recorded with this combination protocol was also higher than in previous published studies. Dual-agent protocols have failed to improve survival times and therefore we conclude that a single-agent protocol using carboplatin may be equally effective with less toxicity.

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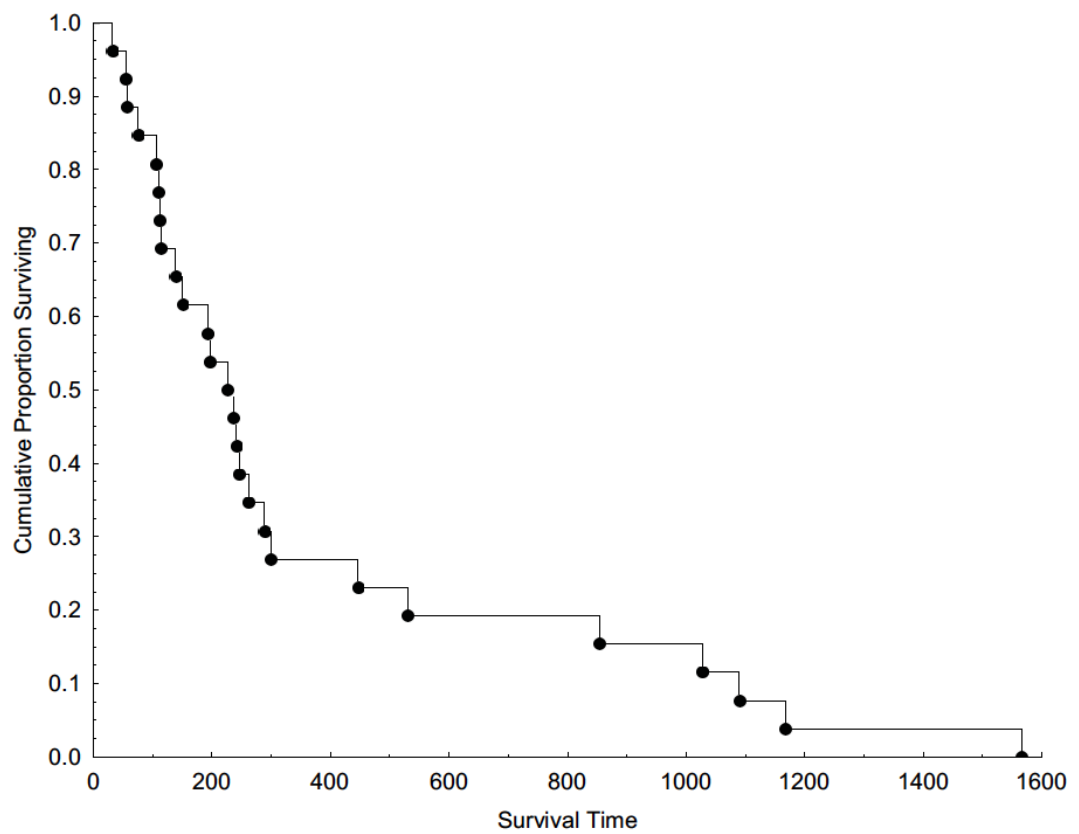


Figure 1. Kaplan-Meier survival function: overall survival time (OST) in days for all patients with appendicular osteosarcoma treated with amputation followed by adjuvant chemotherapy

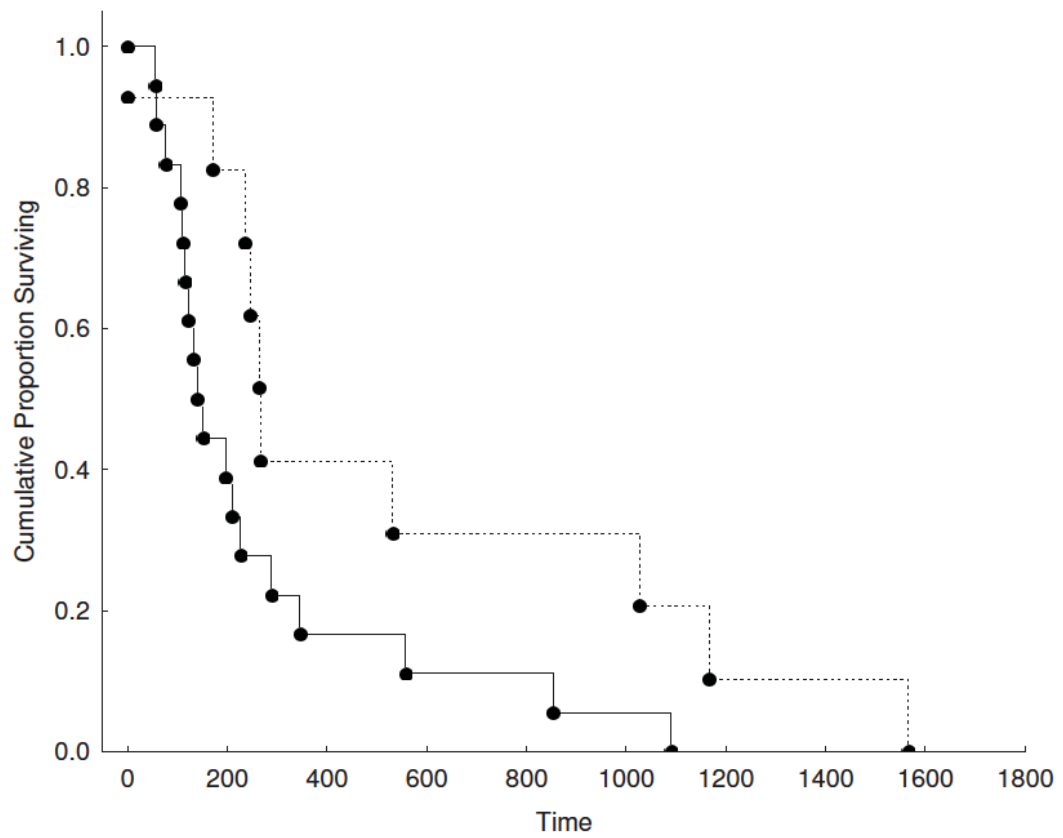


Figure 2. Kaplan-Meier survival function: overall survival time (OST) in days of patients <34 kg bodyweight (dashed line) compared with patients ≥34 kg bodyweight (solid line).



Table 1. Veterinary Cooperative Oncology Group common terminology for adverse events<sup>21</sup>

Toxicity	Grade			
	1	2	3	4
Haematological				
Neutropenia (cells/ $\mu$ L)	1500– 3000	1000– 1499	500–999	<500
Thrombocytopenia (cells/ $\mu$ L)	100,000– 140,000	50,000– 99,000	25,000– 49,000	<25,000
Gastrointestinal				
Vomiting	<3 episodes in 24 h	3–5 episodes in 24 h, or <3 episodes/day for 3–4 days	>5 episodes in 24 h, or persisting for >4 days, or IVF required for more than 24 h	Life threatening
Diarrhoea	Increase of >2 stools/day over baseline	Increase of 2– 6 stools/day, or SCF or IVF required for less than 24 h	Increase of >6 stools/day or IVF required for	Life threatening

longer than

24 h

SCF, subcutaneous fluids; IVF, intravenous fluids.